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Practical Pharmacy Edition

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PREVENTING UNETHICAL CONDUCT

GREAT potentialities for regulating unprofessional and unethical conduct in the practice of pharmacy are inherent in the Emma bill unanimously passed at the last session of the New York legislature and signed by Governor Dewey.

This amendment to the pharmacy law specifically gives the Board of Pharmacy new power to institute disciplinary action against anyone who has been guilty of "untrue, fraudulent, misleading or deceptive advertising, or who has advertised definite fixed prices for the compounding and/or dispensing of prescriptions, or who has been guilty of unprofessional conduct as defined by the regents."

A revision of the New York State Association's code of ethics will soon be distributed to pharmacists as a guide to compliance with the new law. We understand that the legalized code will ban such things as cut-rate signs, games of chance and self-service drug counters.

Nicholas S. Gesoalde, state secretary, has also announced that a Grievance Committee is now being set up, patterned after similar groups in the medical, dental and legal professions. It will consist of five members distributed throughout the state, each of whom will head one or more of nine sectional grievance committees.

Their function will be to review alleged violations and make recommendations to the Pharmacy Board, which has final authority to suspend or revoke a pharmacist's license.

In sponsoring this program the New York State Association and the Board have shown commendable courage and foresight. Whether the difficulties inherent in self-regulation can be overcome remains to be seen. At least the legal machinery is now available to enforce minimum standards of ethics on those pharmacists who have habitually disregarded voluntary codes.

In appealing to New York pharmacists for cooperation, Secretary Gesoalde said:

"It will be your duty, Mr. Pharmacist, to carry on and accept the law, the code of ethics and the action of the Grievance Committee and the Board of Pharmacy in order for you to gain the professional respect to which you are entitled.... For many years pharmacy has been criticized by pharmacists, by physicians, by other professional groups, by the judiciary, by the public press and by the public at large relative to our loose and uncontrolled standards for professionalism. Now, at last, we have the law and are setting up the machinery to wash our own dirty linen and put our house in order."

To this, conscientious pharmacists in other states will say amen—and watch developments. If even moderately successful, the plan will bear consideration elsewhere.

THE SICK PARADE

IT is time for someone to call a halt to the daily sick parade which broadcasts so stridently the alleged faults of our physiologic plumbing. To the radio listener it should be vividly clear that he must rush to his druggist at once for something just like a doctor's prescription.

But somehow our guests never seem to react that way. As one put it: "Why is it that every time I sit down to enjoy a good dinner you pharmacists must broadcast a Baedeker of the human anatomy?"

We are thankful for freedom of speech. We are ungrateful to those speaking too freely on our behalf. Frequent radio "plugs" to see your druggist or ask your druggist can be accepted as free publicity until we think through the difference between publicity, good and bad.

Now known as "plug uglies" in the radio business, these patent medicine announcements are prompting an increasing number of complaints from listeners, one radio executive tells us. Paul A. Porter, chairman of the Federal Communications Commission, says that his agency has noted a similar public resentment.

This important contribution to bad public relations in pharmacy is unfair to the many pharmaceutical manufacturers who maintain good taste and ethical standards in promoting their products. It is unfair to the retail pharmacist attempting to build professional prestige.

Perhaps it is not too much to hope that these proprietary manufacturers will get together with their advertising agencies to take at least the more raucous commercials off the air before the FCC or FTC gives Congress the idea. Although radio stations and networks are apparently unwilling to impose self-censorship because of intense competition for sponsors, the National Association of Broadcasters should be able to bring about some over-all control. Lastly, pharmacists themselves, if they are to handle these products, have a right to ask that promotion be more nearly in accord with scientific limitations and the canons of good taste.

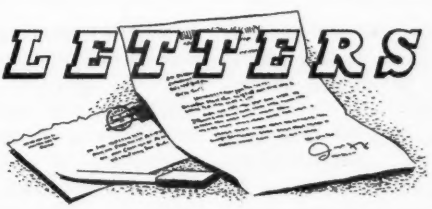
AN ARMY PHARMACIST COMMENTS

Sirs:

After receiving the JOURNAL for the past year and gaining so much needed information, ideas and relaxation, I have decided that I am making a grave mistake by not subscribing to both editions. So rather than continue my subscription to the PRACTICAL PHARMACY EDITION alone, I wish to subscribe to the combination.

I must add my sincere approval of your every article toward making pharmacy the ethical practice it should and will be.

It is up to us young men in the field to see to it that the profession is elevated to its rightful echelon in medical service....



To those merchandisers who say that their money lies in nonpharmaceutical side lines, I say go ahead but do not drag the pharmacist down to the level of the retail salesman. If hardware and toys are more important than pharmacy, why should the establishment be allowed to call itself a pharmacy? Why should pharmacists, a large percentage of whom made their way through college the hard way, sell sets of glassware and the like?

...I happen to be in charge of the pharmacy at this hospital and have had long talks with dozens of medical men. So often I've heard them say, "Back home I used to deal with an old pharmacist who was a real pharmacist—handled mostly drugs." Are we all not real pharmacists? Or did we study for four years to be retail salesmen?

Limberg, Germany ALBERT E. FELDMAN, T/3

SUGGESTIONS ON FILTERING AROMATIC ELIXIR

Sirs:

Another way of avoiding the difficulty of filtering Aromatic Elixir, which you reported under Prescription Information in the July issue, is to add 1 ounce of magnesium carbonate per gallon...

St. John's Hospital B. C. S.
Louree, Mass.

Sirs:

We overcome the difficulties of the official method by mixing with the talc an amount of sugar equivalent to that which would be present in the Simple Syrup. To this add the Compound Spirit of Orange and mix. Then add all of the required amount of water and mix throughly by shaking occasionally for about an hour. Lastly, add the alcohol...

2601 Lorain Ave. L. C. KREJCI
Cleveland, O.

Sirs:

It appears that even after publication of extensive material the official method for preparing Aromatic Elixir is not satisfactory. Some years ago I published the results of a large series of experiments (*Prac. Drugg.*, 50: No. 10, 16, 1932; *J. Am. Pharm. Assoc.*, 25: 123, 1936) indicating that the difficulty mentioned in the query was due primarily to the order of mixing ingredients and I recommended the method of Shiflet (*Prac. Drugg.*, 48: No. 3, 17, 1932) or the substitution of terpeneless oils....

It was also quite evident that some of the difficulties in the use of a filter aid are due to talc so fine that it passes through ordinary filter paper.... After much difficulty we succeeded in getting a quantity of mineral talc coarser than 100 mesh. To our surprise, even mild trituration reduced the mineral to powder finer than 100 mesh...

Chapel Hill, N. C. HENRY M. BURLAGE

ANTIQUE JARS AND THEIR MYSTIFYING LABELS

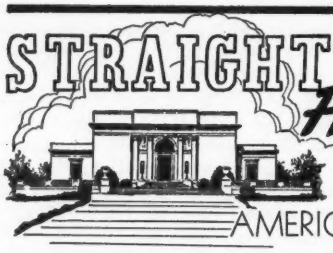
Sirs:

As my husband and I have started a collection of drug jars, the JOURNAL cover showing the beautiful octagon-shaped ones was of especial interest. I wonder if you would help decipher some of our labels: (1) PIEDR. IMAN, (2) LIR: de FL: em P:, (3) PIL. CYNOG... Could you also suggest sources where we might get additional relics?...

Dalton, Ga. MRS. ELLIS OWEN

Dr. George Urdang, director of the American Institute of the History of Pharmacy, advises us that two of the labels are abbreviations of Spanish terms, probably of early nineteenth century origin: PIEDR: IMAN stands for Piedra Iman, meaning blood stone or, in Latin nomenclature, Lapis Haematites. This natural iron oxide had already been mentioned by Dioscorides. LIR: de FL: em P. stands for Lirio de Florence, meaning the peeled and dried rhizome of Iris florentina L., or Iris N. F. The interpretation of "em P" is not certain but probably means "en (em being an antiquated modification of en) paquetas" or "in packages." PIL: CYNOG: stands for Pilulae Cynoglossae. These pills, for which widely differing formulas were given, were used throughout the middle ages and later times until the nineteenth century.

As to pharmaceutical relics, remarkable items can sometimes be obtained from Mr. Henry Schuman, 20 East 70th Street, New York 21. Mrs. Ruth Webb Lee of Framingham, Mass., an authority on antique glass and pottery, may also be able to locate pieces occasionally. Historical treasure has often been unearthed in old and out of the way drugstores and in little used attics.—Ed.



STRAIGHT FROM HEADQUARTERS

by ROBERT P. FISCHELIS, Secretary
AMERICAN PHARMACEUTICAL ASSOCIATION

FROM all over the country we are receiving requests for information as to how men in the military service may be released and returned to their home stations.

Pharmacists in many localities are particularly anxious to have their former assistants released so that they may again be available for prescription and other pharmaceutical work, thus relieving the pharmacy owner of the necessity of continuing to serve long hours and providing some rest for himself and other personnel.

It is quite possible that fatigue from long, continued service without vacation may seriously impair the services available from the pharmacies of the nation if we should be unfortunate enough to be subject to an epidemic of any kind during the coming fall and winter season.

Health officers everywhere have marveled at the extent to which the people of the United States have passed through the war years without serious illness. Epidemics of respiratory diseases run in cycles and it is not beyond the realm of possibility that we may encounter such an epidemic this winter. It will be recalled that the most serious influenza epidemic which we have had came in the winter which followed the end of World War I.

All of this adds up to the necessity for providing for adequate replacements in our professional personnel and to accomplish this we must count on many of the 10,000 men who have served in the Army and the Navy in the last four years.

Applying for Discharge

Army and Navy regulations both provide that commissioned and noncommissioned personnel may be relieved of military duty when the national health, safety or interest are involved.

While there is a difference between the provisions for the discharge of commissioned officers and those who are not commissioned, the general principle is the same.

Enlisted men may be discharged under AR 615-365 if it can be shown that such discharge is warranted in the national health, safety or interest. The initiative must be taken by the enlisted man. He may apply to his commanding officer for a discharge, and this officer has authority to act upon the application at his discretion after consideration of all available facts in the case.

Employer Can Help

To bolster the request of the enlisted man, it is advisable for his former employer or prospective employer to state the reason for his request for the discharge and such request must, of course, be based upon the national health, safety or interest. If the facts set forth by the enlisted man, as well as the employer, are corroborated by health officers, physicians, or municipal officials having knowledge of the particular case, such endorsement will, of course, be helpful to the commanding officer in arriving at a decision.

For the commissioned officer, the procedure is prescribed in Circular 290 of the War Department. Under Section II of this Circular, officers who have completed a reasonable tour of service and who are surplus to the needs of the Army on the basis of their present qualifications and whose retraining in a skill required by the Army would be uneconomical may be relieved from active duty.

If it can be set forth that the officer is in a position to render more valuable service to the nation in a civilian capacity, the Adjutant General may act favorably upon the application under Section III of this Circular.

The application will include information as to the name of the organization which the officer expects to join following his discharge; the type of product produced if it is a manufacturing concern or the title and complete description of the activity to which he expects to devote himself; his connection with this activity prior to service and his particular qualifications for the position which he is about to fill.

A letter from the firm, corporation or appropriate agency, substantiating the facts set forth in the officer's application, will be helpful.

Applications for discharge will be forwarded through channels to the Adjutant General and from that point on will take the prescribed course.

While the foregoing outlines have been stated rather sketchily, men in the service can secure full and detailed information as to the proper procedure, and they can, in turn, inform the organizations which they expect to join as civilians of the procedure which they should follow.

It is not an easy matter to obtain separation from the service under the procedure which declares a man in the service essential to national health, safety or interest, and the procedure should not be tried if discharge from the service in the regular order on points is imminent. However, in cases where there may be a delay because of insufficient points and the man in the service is not required for essential military activity, it would seem entirely logical to endeavor to effect a separation so that he may be made available for essential civilian activity.

We are in the position in all branches of pharmacy today of requiring more professional manpower than is presently available or about to become available. Accordingly, applications for discharge from military duty, submitted by registered pharmacists, should receive more sympathetic consideration on the part of military officials than would be the case if registered pharmacists were plentiful.

The Committee on War Activities and Veterans Affairs of the AMERICAN PHARMACEUTICAL ASSOCIATION will endeavor to be helpful in all cases where the discharge of pharmacists from military duty is warranted. While we are not in a position to follow through each individual case, there is a possibility that information may be supplied in those cases where the man in military service has taken the initiative and complied with all of the routine requirements set forth in military regulations.

COMMITTEE PLANS ACTION ON PHARMACY CORPS

The Committee on Status of Pharmacists in Government Service met at A. Ph. A. headquarters in Washington on September 28 to review the apparent lack of effort by the Surgeon General's Office to expand the Pharmacy Corps and to plan further action. A program was drawn to impress upon the President and other government officials the present inadequacies of Army pharmacy, and a proposal to amend Pharmacy Corps legislation will be referred for approval to various organizations participating in the Committee's work. Representatives from the American Association of Colleges of Pharmacy, National Association of Boards of Pharmacy, National Association of Retail Druggists and the American Pharmaceutical Association attending the meeting were (shown left to right): G. H. Frates, Washington, D. C.; A. L. I. Winne, Richmond, Va.; C. R. Bohrer, West Plains, Mo.; D. B. R. Johnson, Norman, Okla.; H. S. Johnson, New Haven, Conn.; R. L. Swain, New York, N. Y.; A. H. Einbeck, West New York, N. J.; A. G. DuMez, Baltimore, Md.; F. L. McCartney, Norwich, N. Y.; and R. P. Fischelis, Washington, D. C.

A REVIEW . . .

Streptomycin

by SELMAN A. WAKSMAN and ALBERT SCHATZ*

NEW ANTIBIOTIC WITH LOW TOXICITY IS EFFECTIVE AGAINST INFECTIONS NOT REACHED BY PENICILLIN, HERE THE DISCOVERERS SUMMARIZE FOR PHARMACISTS THE WORK THUS FAR

THE story of streptomycin is the story of a search for an antibiotic substance capable of exerting a bacteriostatic and bactericidal effect upon gram-negative bacteria, a substance active against these organisms not only in the test tube but also in the animal body, yet not very toxic nor exerting otherwise undesirable effects upon the body, a substance not inactivated by the body fluids and therefore offering chemotherapeutic potentialities.

In 1939 the Department of Microbiology of the New Jersey Agricultural Experiment Station, Rutgers University, first began to study production of antibiotic substances by microorganisms. These studies resulted in the isolation of a number of compounds:

1. Actinomycin, a highly toxic compound;
2. Clavacin, more active against gram-negative bacteria but also toxic;
3. Fumigacin, not so toxic, but not very active;
4. Chaetomin, nontoxic, but inactive *in vivo;*
5. Micromonosporin, with little promise as an active agent;
6. Streptothricin, a substance combining certain desirable properties, but still somewhat toxic; and, finally,
7. Streptomycin.†

Other antibiotic substances studied by different investigators were also isolated and tested. These included pyocyanase, penicillin-like compounds and products of spore-forming bacteria. Some thousands of actinomycetes, hundreds of fungi and many bacteria were isolated from normal soils and from enriched soils, from composts, manures and peat bogs, as well as from other natural materials. Special methods were devised for the isolation of antagonistic organisms, and techniques were developed for the production, isolation and study of the active antibacterial substances, the antibiotics. The isolation of streptomycin must, therefore, be looked upon as the result of extensive surveys, detailed analyses and numerous tests, in which many collaborators have participated and to whom a good part of the credit is due.

Isolation of Streptomyces Griseus

In the search for antagonistic microorganisms, especially organisms that are active against gram-negative bacteria, the actinomycetes were found[1, 3, 4] to offer extensive potentialities, 20 to 30% of all the organisms tested possessing marked antibacterial properties.

These cultures were either isolated from different soils and composts or were taken from the type collections and tested for their ability to inhibit the growth of bacteria. Very few of these cultures offered potentialities as producers of antibiotic substances that could be used for chemotherapeutic purposes.

The first among these was streptothricin,[2, 11] which was active not only *in vitro,* but also *in*

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* Condensed from a paper published in the November issue of the *Scientific Edition* of THIS JOURNAL (34:273, 1945). Received from the New Jersey Agricultural Experiment Station, Rutgers University, New Brunswick, N. J.

† New drug applications have not yet become effective to permit general distribution of streptomycin. The many problems of production, standardization and clinical evaluation which remain to be solved indicate that it will be at least some months before the drug is available on prescription.

vivo,[5, 6] and appeared to offer promise in the treatment of diseases caused by gram-negative bacteria. Upon subsequent investigation, however, certain serious pharmacological disadvantages of streptothricin were revealed.

Streptothricin Unsatisfactory

Purified preparations exerted a delayed toxic effect upon animals.[9, 13, 42] In addition certain gram-positive as well as gram-negative bacteria were found to be naturally resistant to fairly high concentrations of this antibiotic.[41]

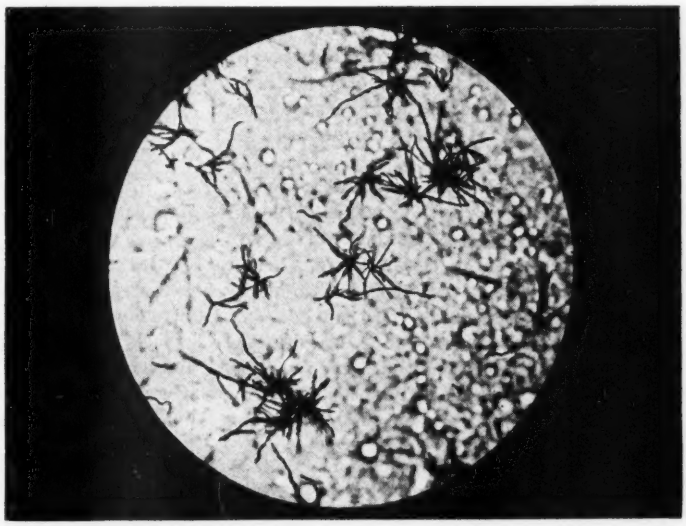
The limitations of streptothricin, combined with the information thus gained in the isolation of potential chemotherapeutic agents, suggested a search for antibiotic substances which might be free of the undesirable properties of streptothricin and which could safely be used for treating diseases caused by infections with gram-negative bacteria.

Simultaneously, studies were initiated of the formation by microorganisms of antibiotics active against pathogenic acid-fast organisms. The marked resistance of mycobacterial diseases to chemotherapy, and the ineffectiveness of penicillin and other antibiotics in the treatment of such diseases were well known. The fact that certain fungi, notably *Aspergillus fumigatus*, and bacteria were found[40] capable of suppressing the growth of *Mycobacterium tuberculosis* suggested the advisability of searching among various groups of microorganisms for agents that could be utilized for chemotherapeutic purposes.

These studies resulted in the isolation of an actinomyces[17, 19] which was found capable of producing, in certain media, an antibiotic substance that apparently possessed many of the desirable antibacterial and pharmacological properties. This organism was similar, in its appearance, cultural characteristics and morphologic structure, to *Actinomyces griseus* which had been isolated from the soil some twenty-eight years previously in our laboratory (*Fig. 1*).

The antibiotic substance produced by the freshly isolated strain of this organism, in a medium containing meat extract, was very similar to streptothricin. It differed from the latter in its greater activity against certain gram-negative bacteria, notably *Proteus vulgaris*, *Pseudomonas aeruginosa* and *Serratia marcescens;* and even more significant was its greater action against those aerobic spore-forming bacteria, such as *Bacillus mycoides*, which were resistant to streptothricin.

This substance was designated as streptomycin, the name being derived from the generic designation given to the sporulating and aerial mycelium producing group of actinomycetes, namely *Streptomyces*. Characteristics of these organisms relate them to both bacteria and molds.



(Fig. 1) STREPTOMYCIN-PRODUCING strain of Streptomyces griseus, showing spore-forming aerial mycelium. Magnification is about 200 times.

Two cultures of the streptomycin-producing strain of *Streptomyces griseus* were obtained, one (No. 18-16) from a heavily manured field soil and the other (No. D-1), a somewhat less active form, from the throat of a chicken. The almost simultaneous isolation of the two cultures and the appreciable difference in activity between the cultures at the time of isolation constitute evidence that they were independent isolations, rather than that one was obtained as a spore contaminant of the other.

PRODUCTION AND ACTIVITY OF STREPTOMYCIN

COMPOSITION of the medium has a marked effect upon the production of streptomycin, in contrast to the formation of streptothricin in fairly simple media. Streptomycin production depends largely upon the presence in the medium of a certain organic substance supplied by meat extract.[19] Corn-steep liquor can take the place of meat extract, although the problem of purifying streptomycin is thereby complicated.

The nitrogen and carbon sources are more or less nonspecific, starch and glycerol being satisfactory substitutes for glucose; while unhydrolyzed and hydrolyzed casein, various tryptones, amino acids, and sodium nitrate are approximately as effective as peptone.

A medium was finally adopted consisting of:

Glucose	10 Gm.
Peptone	5 Gm.
Meat extract	5 Gm.
Sodium chloride	5 Gm.
Tap water	1000 ml.

Final *p*H 6.5–7

In shaken cultures, maximum growth occurred in two days, accompanied in two to three days by maximum activity. In stationary cultures, growth was more gradual, the maximum being reached in nine days. The medium became alkaline in both cases.[17]

The strains of *Streptomyces griseus* that produce streptomycin are not absolutely stable and undergo marked variation.[39] On plating out the active culture of this organism, certain variants can be obtained which differ considerably in their ability to produce streptomycin.

The antibiotic potency of the active cultures of *S. griseus* is fairly stable. With the same medium and under the same cultural conditions, the comparative differences among different strains remain approximately the same. A highly active strain retains its relatively superior potency, whereas a poor strain usually remains a weak producer of streptomycin. The formation of streptomycin by an active strain takes place alike in stationary and in submerged culture.

In the practical production of streptomycin, the formation of inactive variants by *S. griseus* need not be feared. Conditions for obtaining the inactive variants are so completely different from those commonly employed in the laboratory or in the industrial production of the antibiotic agent, that the possibility of strain degeneration is very small indeed.

The selective effects upon different bacteria, or the bacteriostatic spectra of streptomycin and streptothricin, are presented in Table I. The spectra emphasize the differences in the antibacterial properties of the two antibiotics.

TABLE I—BACTERIOSTATIC SPECTRA OF STREPTOMYCIN AND STREPTOTHRICIN[a]

Comparative Activity of Two Crude Preparations in Dilution Units, as Determined by Plate Method

TEST ORGANISM	STREPTOMYCIN	STREPTOTHRICIN
Bacillus subtilis	25,000	30,000
Bacillus mycoides	7,500	< 100
Staphylococcus aureus	1,500	2,000
Mycobacterium phlei	10,000	5,000
Mycobacterium tuberculosis (Human, H37)	3,000	100
Escherichia coli	2,000	3,000
Shigella gallinarum	2,000	5,000
Salmonella pullorum	3,000	5,000
Serratia marcescens	2,500	200
Pseudomonas aeruginosa	300	50

With crude preparations and with *E. coli* as the test organism streptomycin is shown to have virtually the same activity as streptothricin against *Bacillus subtilis*, *Staphylococcus aureus*, and certain strains of *Salmonella* and *Pr. vulgaris;* it is somewhat less active against *Shigella*, and much more active against *B. mycoides*, *Mycobacterium phlei*, *M. tuberculosis*, *S. marcescens*, *Ps. aeruginosa*, and others.

ISOLATION OF STREPTOMYCIN FROM THE MEDIUM

STREPTOMYCIN is water-soluble and is insoluble in such organic solvents as ether, chloroform and acetone. It may be readily isolated from the medium and concentrated by a method similar to that previously developed for streptothricin.[2, 11]

When the culture broth has attained its maximum antibiotic activity, incubation is terminated. The mass of growth of the organism is separated from the broth by centrifugation or by filtration. The selection of a filter is important, since streptomycin is rapidly adsorbed on various filters.

The cell-free culture fluid, alkaline at the time of recovery, is treated with active charcoal (such as Norit) which adsorbs the antibiotic completely. The charcoal adsorbate is centrifuged or filtered off, and washed first with alcohol to remove some of the impurities and then with dilute acid-alcohol to bring the streptomycin into solution.

After the removal of the charcoal, the acid-alcoholic solution is neutralized and filtered to remove certain impurities that have precipitated out.

The resulting solution is then concentrated by the addition of 10 volumes of ether, which takes up the alcohol and leaves the streptomycin as a yellow, brown or red aqueous concentrate. A solid preparation may be obtained by precipitation of such a concentrate with acetone or by desiccation *in vacuo*. Much of the early work on the toxicity and antibacterial action of streptomycin *in vivo* was carried out with impure material prepared in this manner.

Further purification and, finally, crystallization of streptomycin involve the preliminary preparation of an impure concentrate, obtained by the above-mentioned adsorption on charcoal, and its subsequent elution with dilute acid solution. The addition of methyl orange (the sodium salt of helianthine) results in crystallization of the relatively insoluble streptomycin-helianthate, which can then be converted to soluble salts of streptomycin.[36]

A second method[34] for the crystallization of streptomycin also utilizes the acidic eluate of the charcoal adsorbate. After precipitation with phosphotungstic acid, the liberated bases are converted into the crude picrate which is then fractionated by chromatographic techniques. Upon removal of the picric acid, one or several of the resulting fractions yield amorphous products which are water-soluble and highly active. The addition of Reinecke salt, $NH_4[Cr(SCN)_4(NH_3)_2]$, to aqueous solutions of these active fractions gives crystalline precipitates. From this mixture, pure streptomycin reineckate can be isolated by fractional crystallization. The insoluble reineckate can be converted to soluble salts, such as the hydrochloride or the sulfate.

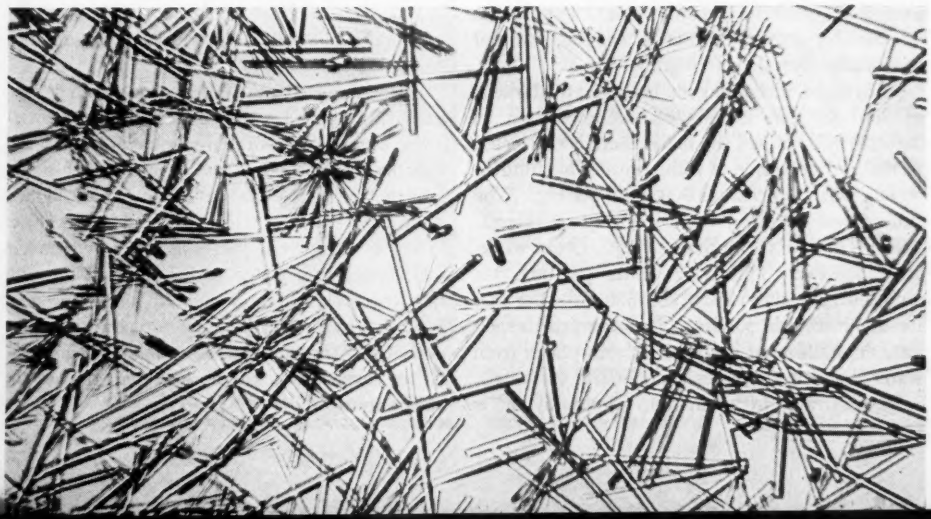
METHODS OF STREPTOMYCIN ASSAY AND UNITAGE

To test for the presence or absence of streptomycin in a culture medium, a qualitative procedure for determining inhibition of growth of certain test bacteria is satisfactory. However, for the production and isolation of this antibiotic, as well as for pharmacological investigations and clinical use, it is essential to use quantitative methods to measure antibiotic potency.

For this purpose, several methods are commonly used, namely, the liquid dilution method, the agar dilution streak method,[44] the agar cup or agar-diffusion method, the turbidimetric method or some other convenient procedure.

Originally a unit of streptomycin, or an S unit, was arbitrarily defined as that amount of material which, when present in 1 ml. of nutrient medium, will just inhibit the growth of a given strain of *E. coli*.[37] This unit is a convenient quantitative standard for the study of the production and isolation of streptomycin, as well as for microbiological studies of its antibacterial action *in vitro*.

The small size of this unit, however, is rather



(Fig. 2) CRYSTALLINE STREPTOMYCIN in the form of a double salt. Photomicrograph by courtesy of Folkers et al., Merck & Company.[51]

awkward for pharmacological investigations and clinical use. Consequently there were proposed, in addition to the S unit, an L unit, or that amount of material that will just inhibit growth of the particular strain of *E. coli* in 1 L. of nutrient medium, and a G unit based on the activity of the crystalline material. For the pure streptomycin base, a G unit was found to approximate closely 1000 L units or 1,000,000 S units. Since crystalline streptomycin is now available, a new standard is being established based on the weight of the pure streptomycin base, one microgram of which is equivalent to one unit.

It is of utmost importance that the unit of streptomycin be clearly understood. This is especially true when attempts are made to compare the efficacy of streptomycin with that of penicillin, since the two antibiotics are standardized differently.

Whereas the Oxford unit of penicillin is based on inhibition of the gram-positive *S. aureus* in 50 ml. of medium, the streptomycin unit is defined in terms of its action against the gram-negative *E. coli* in 1 ml. of medium. The Oxford unit represents a much greater *in vitro* activity than does the streptomycin unit. Therefore, any comparison between the two agents which does not appreciate this fundamental difference in unitage may very likely confuse rather than clarify experimental results.

In terms of dry weight, 1 streptomycin unit equals 1 microgram, whereas 1 Oxford unit of penicillin equals 0.6 microgram. It is to be remembered, however, that the activity of streptomycin is measured against the rather resistant gram-negative bacteria, such as *E. coli*, and that of penicillin against the more sensitive gram-positive bacteria, such as *S. aureus*.

For the determination of streptomycin in body fluids, a modification of the agar-cup method may be used.[38] Since normal blood contains a diffusible agent which produces large zones with *B. subtilis* as the test organism, a particular strain of *S. aureus* is employed instead.

In pharmacological and clinical work, streptomycin can also be quantitatively determined by the slide cell method similar to that used for assaying penicillin in body fluids; the principal change is the substitution of *Bacillus megatherium* for *Streptococcus pyogenes* as the test organism.[38]

In testing for sterility of streptomycin preparations or for the purpose of determining the presence of other antibiotics admixed with streptomycin, it may become necessary to inactivate streptomycin. Inactivation by cysteine[35] offers a possible procedure, especially as cysteine has no effect upon streptothricin. One can thus not only differentiate the two antibiotics but also determine the relative amounts of each in mixtures of the two.[46] Inactivation of the streptomycin is reversible, and is not a property of the sulfhydryl group alone, nor limited to cysteine.

CHEMICAL AND BIOLOGICAL PROPERTIES

BECAUSE of streptomycin's solubility in water, insolubility in organic solvents, adsorption on charcoal from an alkaline solution, and elution by dilute acids, as well as the high nitrogen content of the concentrated preparations, streptomycin was from the beginning suspected of being an organic base. This initial assumption proved correct when the material was finally crystallized (*Fig. 2*).

Anhydrous streptomycin helianthate darkens at 205° C. and melts with decomposition at 220–226° C. When the helianthate is converted to the hydrochloride, a white powder is obtained which, when dry, assays 800 units per mg. The sulfate was reported by one group of investigators[36] to give 520 units per mg. Other workers,[34] however, found 850 units per mg. for streptomycin sulfate, and 500–530 units per mg. for streptothricin sulfate. Streptomycin reineckate crystallizes in the form of thin plates from water,[44] and decomposes at 162–164° C. (corr.).

In contrast to penicillin, streptomycin is markedly stable both chemically and biologically. Solid preparations of relatively high activity have been stored in the refrigerator for periods greater than six months without any loss in potency. Dilute sterile solutions have maintained their initial activity after fifteen to seventeen days at 37° C. Heating solutions of streptomycin for ten minutes at 100° C. produces an inactivation which is less than 50%.

Crude as well as highly concentrated solid preparations are hygroscopic.

So far no microorganisms have been found capable of destroying streptomycin. It is not labile in this respect as are some other antibiotics, such as penicillin, gliotoxin and pyocyanase. When streptomycin solutions, prepared on the one hand with water and on the other with nutrient broth, were inoculated with *Aspergillus niger* or a mixed culture of bacteria and fungi, the activity of the cultures, after incubation at 28° C. for seven days, was no less than that of the sterile controls.

ANTIBACTERIAL ACTION OF STREPTOMYCIN IN VITRO

THE action of streptomycin is generally bacteriostatic in low concentrations and bactericidal in larger amounts. Although streptomycin possesses a lytic effect upon the living cells of *B. subtilis*, it does not thus act upon the dead cells of this organism or upon living *S. aureus*. It is active against a variety of pathogenic gram-positive and gram-negative bacteria, including *M. tuberculosis*, *Eberthella typhosa*, *Pasteurella tularensis*, *Klebsiella pneumoniae*, *Brucella abortus*, *Pr. vulgaris*, *Salmonella schottmülleri*, *Hemophilus pertussis*, *H. influenzae*, *Ps. aeruginosa*, and many others.

Streptomycin has only a limited action *in vitro* upon spore-forming anaerobes. However, it exerted a definite bactericidal effect *in vitro* upon a mixed culture of an anaerobic *Streptococcus* and *Pr. vulgaris*.

Streptomycin is active against acid-fast bacteria. *M. phlei* and the pathogenic H37 strain of *M. tuberculosis*, var. *hominis* were found to be almost as sensitive as *B. subtilis* and *B. mycoides;* however, *M. avium* was more resistant than either *E. coli* or *Ps. aeruginosa*. In order to kill the tubercle bacillus, an exposure of the cells to 200–300 micrograms per ml. for a few days or to smaller amounts for a longer period of time was necessary. Streptomycin has a marked effect upon organisms related to the mycobacteria.

Erysipelothrix muriseptica and various pathogenic and saprophytic actinomycetes were inhibited by rather low concentrations of streptomycin.

However, the active strains of *S. griseus*, the organism which produces streptomycin, are exceedingly resistant to this antibiotic. Streptomycin has very little activity against fungi.

Gram-negative organisms subjected to the action of streptomycin revealed an elongation of the cells.[22] Since the morphological changes were induced at greater dilutions than the minimal inhibitive level, it appears that the antibiotic agent may "influence the normal rate of division and hence the pathogenicity of the organism."

The antibiotic action of streptomycin depends upon the composition of the medium, its reaction and presence or absence of certain substances. Among these, the salt effect, reaction of the medium and the presence of glucose are particularly significant.

The optimum *p*H for the activity of streptomycin is 9.[19] The unfavorable effect of an acid reaction may be due to the fact that streptomycin being a base, is not so active in the form of a salt as in a free basic state, or that the active part of the molecule is neutralized by the acid.

The presence of glucose tends to reduce the activity of streptomycin appreciably, 2 mg. of glucose in 10 ml. agar being sufficient to reduce by one-half the potency of streptomycin.[19] This may be due to the reducing properties of glucose or to the production of some acid by the test organism. It is to be recalled that streptothricin shows the same sensitivity to salts (phosphate), to acidity of medium and to glucose.[7, 8]

Not only is streptomycin strongly bacteriostatic against various gram-positive and gram-negative bacteria, but it also exerts a marked bactericidal effect. This is illustrated by an experiment[40] which tested the effect of streptomycin upon two strains of *Pr. vulgaris* and upon a resistant strain (R) developed by gradual passage through media containing the antibiotic. In the absence of streptomycin, rapid multiplication occurred in all three cultures. The addition of 1 unit or 1 microgram of streptomycin reduced the numbers of strain W1 from 375 million to 10 thousand per ml. and of W2 from 615 million to

Merck

LABORATORY SCALE PRODUCTION of Streptomyces griseus inoculum on shaking machines.

650 thousand; the reduction of the resistant strain, however, was only from 560 to 190 million per ml. The addition of 5 micrograms of streptomycin brought about nearly complete destruction of all the cells of cultures W1 and W2, whereas the reduction of the resistant culture was only two-thirds of the original number of cells. There is no doubt that even the resistant culture was subject to the bactericidal action of the streptomycin, but much more of the drug was required.

The problem of variation in sensitivity of different strains of the same organism to the action of streptomycin is of considerable importance from a chemotherapeutic point of view.[40] The sensitivity of a given culture of an organism to streptomycin is characteristic not only of the organism but of the strain as well. Tests indicate[40] that the sensitivity of an organism to streptomycin is more characteristic of the strain than of the species.

PHARMACOLOGY, TOXICOLOGY AND ACTIVITY IN ANIMALS

STUDIES of the absorption and excretion of streptomycin in mice, dogs and monkeys have shown that this antibiotic behaves by parenteral administration like penicillin, in that both agents are rapidly absorbed and excreted. Therapeutic blood levels are easily produced by intravenous or subcutaneous injections. Oral dosage, on the other hand, results in very low blood concentrations. Subcutaneous injections of 100–200 micrograms protect mice against lethal infections with *S. schottmülleri*, whereas by oral administration much more streptomycin is required.

The toxicity of streptomycin, especially of purified preparations, was found to be extremely low. When present, it revealed itself in animals usually as a histamine-like reaction, the visible symptoms in mice being increased activity, marked dyspnea and, occasionally, respiratory failure.[22]

In rabbits, the more toxic lots caused a decrease in blood pressure, an effect similar to that produced by streptothricin. In view of the fact that the unfavorable reactions are not observed with many impure batches and are absent when pure preparations are used, this type of toxicity is undoubtedly due to certain impurities present in the toxic lots.

In contrast to streptothricin, with which death is delayed for a few days or longer, any lethal action of streptomycin is revealed within twenty-four hours or less after administration.

According to Molitor and Mushett[48] of the Merck Institute, a second toxic effect, especially pronounced in monkeys, is observed following prolonged administration with large doses of streptomycin. This reaction occurs as a fatty infiltration of the liver and occasionally of the kidney. The metamorphosis involves the presence of fine to moderate sized fat globules, primarily in the cord cells of the liver.

In the kidney, the fat deposition is always slight, being primarily in the basal portion of the renal epithelium. This type of toxicity is ordinarily not found in rats, and appears to be related to the low protein diet of the monkeys. The organ pathology of the monkeys has been shown to be a reversible phenomenon and not the preliminary step of a progressive degeneration.

The first animal studies with streptomycin were carried out with crude preparations assaying about 30 micrograms per mg.; their toxicity was LD 0 = 35 mg. and LD 100 = 135 mg. per 20 Gm. mouse, by intraperitoneal injection.

To protect 18–20 Gm. mice infected with *S. schottmülleri*, 6.5 mg. of the crude material was required.[18] With *Ps. aeruginosa*, mice were protected by 190–380 micrograms found in 6.4–12.8 mg. of crude preparation. Complete protection of experimental animals infected with *Pr. vulgaris* was also obtained with streptomycin. The results of studies with eleven-day-old chick embryos have shown that adequate concentrations of streptomycin can control fowl typhoid caused by *Shigella gallinarum*.[18] Excellent protection was also obtained against *Brucella abortus* in chick embryos.

Infections due to certain gram-positive organisms have been found to be somewhat more resistant to streptomycin. Nevertheless, experimental infections caused by *Diplococcus pneumoniae* and *S. aureus* were readily controlled by adequate doses of streptomycin. Streptothricin, under the same conditions was not effective.

Streptomycin was found to have a marked protective effect in experimental tularemia in mice.[24] In an experiment where the mortality of 30 control animals was 100% within ninety-six hours after infection, the survival of 30 mice that received 1000 micrograms of streptomycin daily was 100% for ten days. Those animals that had initially received 10 lethal doses of the organism

possessed slight immunity to 1000 lethal doses twenty-eight days after the original inoculation.

In view of the high morbidity of tularemia and the lack of successful serum therapy, the favorable effect of streptomycin suggested that the antibiotic might find use in the treatment of this disease in humans.

In experimental infections with *Klebsiella pneumoniae*, streptomycin also exerted a marked protective effect.[25] With doses of 185–500 micrograms daily, administered over a period of two to three days, 42 out of 49 mice survived intra-abdominal inoculation of 1000 to 10,000 lethal doses of the pathogen. In contrast, all 49 untreated controls died.

Somewhat similar results were obtained with intranasally infected animals. Though treatment with 500 micrograms daily for three days gave only slight protection, an extended treatment for seven days enabled the organism to survive in 13 out of 15 cases, the mortality of the 15 controls being 100%. These results suggested the possible usefulness of streptomycin in the treatment of human infections due to the Friedländer bacillus.

Streptomycin inhibits the growth of *H. pertussis* in concentrations of 3 micrograms per ml. and is bactericidal in concentrations of 15 micrograms. When mice were infected with 5000 cells and 2 micrograms streptomycin given for ten days, 50% of the mice were protected and the survival time of those that died was extended to twenty-two days as compared to five and a half days for the controls.[45]

The development of the human strain of *M. tuberculosis* in guinea pigs can be controlled by streptomycin.[26] In experimental infections of guinea pigs with *M. tuberculosis, hominis*, carried out at the Mayo Clinic by Drs. Feldman, Hinshaw and Mann, streptomycin has been found to exert a strikingly suppressive effect upon the pathogen under the conditions imposed.[29]

Although it appears that streptomycin may prove to be the most effective agent yet found for the treatment of experimental tuberculosis in guinea pigs, it should be emphasized that these findings must be viewed with the utmost conservatism. The very resistant nature of tuberculosis, the lack of uniform correlation between animal experiments and behavior of an agent in humans, and the fact that some drugs of the sulfone series have given results comparative to those obtained with streptomycin are only some of the reasons why a very cautious attitude must be assumed toward the practical use of this antibiotic in tuberculosis.

Streptomycin also exerted a marked protective effect in experimental infections with *Borrelia novyi* and *Leptospira icterohemorrhagiae*,[28] but it did not suppress malarial infections.[27]

TOXICOLOGY AND PHARMACOLOGY OF STREPTOMYCIN IN MAN

BOTH the toxicologic and pharmacologic properties of streptomycin readily allow its use in the treatment of diseases in man according to Molitor, Robinson and Mushett[48] of the Merck Institute. Pure streptomycin, as well as many impure concentrated preparations, has been given at therapeutic levels in doses as high as 4 Gm. daily without any unfavorable reactions.

In order to produce toxic manifestations in animals, it is necessary to administer either extraordinarily large amounts of the pure material or smaller amounts of certain impure preparations containing a histamine-like substance. No correlation was obtained between the acute toxicity of different lots to experimental animals and clinical tolerance by humans.

The behavior of the material in man cannot, therefore, be foretold if antibacterial potency alone is assumed to be the criterion of purity. Highly concentrated material has on occasion been unsatisfactory clinically, whereas considerably less active preparations have often produced no undesirable effects.

This lack of correlation is believed to be due primarily to the fact that the lethal and morbid toxicities of streptomycin do not result from the same causes and that only the latter is observed in man. The problem is further complicated by the difficulty of studying many reactions, such as drug fever and arthralgia in experimental animals, the variation of individual patient susceptibility and the inability of many preparations to produce clinical side reactions even when administered in excessively large amounts.

Two distinctly different types of toxicity are possible. One, which is observed only with certain impure preparations, is due to a histamine-like substance. The general syndrome produced in man consists essentially of nausea, throbbing headache, general malaise, skin rash, pain in the joints, flushed face, vomiting and drug fever, the last appearing two or three days after treatment and therefore not due to bacterial pyrogen. Local reactions at the sites of injection have also been encountered. These toxic manifestations are entirely absent when crystalline streptomy-

cin, as well as many impure preparations, is used. By employing only pure streptomycin or impure concentrates which do not possess this factor, it is possible to eliminate the undesirable side reactions.

The second kind of toxicity, which results in a fatty metamorphosis of the liver and kidney of animals, is an inherent property of streptomycin itself. However, this organ pathology has not been observed in man. Clinical information obtained by Hinshaw[48] of the Mayo Clinic in studies with patients who had received 1 to 4 Gm. of pure streptomycin daily for twenty to ninety days has failed to demonstrate any nephrotoxic properties of streptomycin; nor was there any functional impairment of the liver which could be attributed to prolonged administration of the agent.

Streptomycin has been administered intramuscularly, intravenously and subcutaneously both by intermittent injection and by continuous drip. It has also been given orally and by nebulization into the tracheobronchial tree.

By the intravenous route a high serum concentration is produced very rapidly, whereas the same level is obtained but more slowly after intramuscular or subcutaneous injection. However, the blood level falls rapidly following a single dose and must be maintained by repeated administrations. When given orally or by nebulization into the tracheobronchial tree, no appreciable amount of streptomycin is absorbed into the general circulation.

According to Adcock[48] of the University of Michigan, the intravenous injection of single doses of 200 mg. of streptomycin gives an immediate concentration in the serum of 32 micrograms per ml. This falls rapidly to 8 micrograms at the end of two hours and to 1 or 2 micrograms at the end of twelve hours. Intramuscular injection of the same amount gives a peak serum level of 16 micrograms at the end of one hour, followed by a slower drop in serum concentration, with detectable amounts after twelve hours.

Streptomycin rapidly appears in the urine, 20 to 35% being recovered in two hours, and 50 to 70% in the twelve-hour period after administration of a single dose. The total recovery varied from 15 to 85% of the daily dose, with an average of 53%.

When given parenterally, small amounts of streptomycin appear in the spinal fluid, namely, 1 to 2 micrograms as compared to 25 micrograms in the serum. Following oral administration, very little streptomycin reaches the serum, and only 0.2 to 0.5% is found in the urine; however, there is a high concentration in the feces.

Similar results were obtained by Zintel[48] of the University of Pennsylvania and by others. Reimann[31,48] of the Jefferson Hospital has also found that parenteral administration of streptomycin leads to its rapid excretion through the kidneys.

When ingested streptomycin is not appreciably absorbed nor is it destroyed in the intestine.[31,48] This persistence and stability in the gut has been used to advantage for the treatment of typhoid patients. The oral administration of streptomycin rendered the feces completely negative for *E. typhosa* and considerably reduced the numbers of *E. coli* as well as the general fecal population.

The studies of Hirshfeld[48] at Wayne University together with those of Zintel[48] have shown that when the blood concentration is high some streptomycin does diffuse into the cerebrospinal fluid, but the amount is generally slight. On the basis of the available information, it would seem that intrathecal injection is a much more satisfactory means for producing therapeutic levels in the spinal fluid.

After parenteral administration, streptomycin has been detected in the ascitic, peritoneal and pleural fluids in concentrations approximating the level in the blood. Lesser amounts have been found in the bile. According to Adcock,[48] a trace to several micrograms was present at autopsy in the heart muscle, brain and liver of two treated patients.

PRESENT STATUS OF STREPTOMYCIN THERAPY

ALTHOUGH considerable experimental work is being conducted on the clinical use of streptomycin, only a limited amount of the unintegrated information is available at the present time. To date, streptomycin has been tried in human infections resistant to penicillin, the sulfa drugs and serum therapy. According to Greey[48] of the University of Toronto, in the treatment of chronic infections of the urinary tract streptomycin is effective in destroying such gram-negative bacteria as *Pr. vulgaris*, *A. aerogenes*, *E. coli*, *Ps. aeruginosa* and *Eberthella* sp. Four hours after commencement of streptomycin therapy (1 Gm. of streptomycin daily in 8 divided doses given intramuscularly), urinary cultures were negative for *Pr. vulgaris* and, after eight hours, for coliform organisms. In one case, the urine became negative for *E. coli* two hours after treatment.

Though infections of the normal urinary tract

were permanently cleared up, reinfection was likely to occur in damaged tracts, the catheter serving as the portal of entry for the new infection. Similar results have been obtained by the U. S. Army Medical Corps in the successful treatment of heretofore resistant urinary tract infections.

Streptomycin has also proved effective for the treatment of enteric and systemic diseases. In five severe to moderately severe cases of typhoid, studied by Reimann,[31] streptomycin was not administered until late in the development of the disease. Nevertheless, the clinical improvement of three patients coincided with the period of streptomycin therapy. In the two unsuccessful cases, the treatment of one was prematurely discontinued because of the limited quantity of streptomycin available; failure in the other has been postulated as a result of inadequate dosage or the presence in the body of a substance inhibitive to the action of streptomycin. The latter explanation is not very plausible, however, in view of the severity of the particular case, the long delay in parenteral administration, and the fact that no specific streptomycin inhibitor has yet been demonstrated in the human or animal body. Although the different strains of typhoid bacteria varied in their sensitivity to streptomycin, there was no evidence of increased resistance developed *in vivo* during the period of therapy. Although oral administration alone was inadequate to produce appreciable blood levels and urine concentrations essential for typhoid control, it nevertheless rendered the feces free of *E. typhosa*.

In general it has been suggested that for the treatment of bacillary infections of the intestinal and urinary tracts streptomycin be given both orally and parenterally, the former during the disease as well as in the convalescent period to prevent reinfection and the carrier state. Oral administration also has been suggested under certain conditions as a prophylactic measure against intestinal infections.

In systemic infections, streptomycin has been used by Reimann[48] to combat *Brucella* infections. In view of the variable behavior and chronic nature of the disease and the limited number of patients thus far treated, no conclusion concerning the efficacy of streptomycin against *Brucella* infections is justifiable at the present time. The results, though encouraging, are inconclusive.

In *Klebsiella* infections, streptomycin has been found to exert a much more definite action. When treated by Herrell of the Mayo Clinic (quoted by Heilman[28]) two patients with Friedländer infections of the respiratory tract showed prompt disappearance of *Klebsiella* upon the institution of streptomycin therapy. Previously, the pathogen had been persistently present in the sputum.

Flippin[43] of the University of Pennsylvania observed that *Salmonella* as well as *E. coli* infections lend themselves readily to treatment with streptomycin. A patient with a colony count of 23 million *Salmonella* in the stool gave a negative stool after four days' oral therapy with 1 Gm. streptomycin daily; the number of *E. coli* were reduced simultaneously to about 1000; *Strep. faecalis* disappeared and the clostridia were reduced from 75,000 to 8000. Acute brucellosis was successfully treated by intramuscular administration of streptomycin.

According to Foshay[48] of the University of Cincinnati, *P. tularensis* is one of the most sensitive organisms *in vitro* to the bactericidal action of streptomycin. With only a few micrograms per milliliter, the killing effect is complete within a matter of seconds, or of minutes at the most. It is not surprising, therefore, that the parenteral administration of relatively low doses of streptomycin has proved remarkably successful in human tularemia. Although the mortality of this disease is low, its morbidity is high; for over 500 untreated cases, the mean duration was 3.9 months. One patient who began to receive streptomycin on the eighth day of the disease was sent home as cured on the seventeenth day. In another case with perisplenitis and generalized infection of the peritoneal cavity, the peritoneal fluid was noninfective on the sixth day after treatment, whereas such fluid is usually infective for at least nine months. Of 7 cases which had received streptomycin all responded promptly.

Hinshaw and Feldman[47] at the Mayo Clinic treated 22 tuberculous patients with streptomycin without any serious toxic effects, even after prolonged administration of large doses. They concluded, however, that any decision as to the therapeutic efficiency of the antibiotic must await further study. Hinshaw[48] later observed in a variety of human infections of *M. tuberculosis* that treatment with streptomycin gave some encouraging results.

Hinshaw and Feldman[50] reported the results of preliminary impressions obtained from the study of 34 patients who had tuberculosis and were treated with streptomycin for a period of nine months. It appeared that streptomycin exerted a limited suppressive effect, especially on some of the more unusual types of pulmonary and extrapulmonary tuberculosis. However, although the reproduction of *Mycobacterium tuberculosis* appeared to be temporarily inhibited

by the treatment, no convincing evidence was obtained as to a rapidly effective bactericidal action.

It must be emphasized that the information available is much too limited in scope for any evaluation at the present time. The pathological nature of tuberculosis and the clinical characteristics are such that prolonged treatment and studies of many cases are absolute prerequisites for any serious consideration of the efficacy of streptomycin in the treatment of this disease. To date, sufficient information has not been accumulated.

Limited results have been obtained for meningitis from the treatment of a dozen or so cases. According to Margaret Smith[48] of Sydenham Hospital and Birmingham[48] of the Johns Hopkins Hospital, some patients recovered from influenzal meningitis following administration of streptomycin alone. When insufficient doses of the drug were used, there was a definite development of drugfastness of the organism. It was believed that optimal treatment may finally comprise streptomycin coupled with sulfadiazine or with serum therapy, or both.

Sterilization of spinal fluid and blood was accomplished, in a case of a four-year-old boy, in nine hours. The treatment consisted of injections of 200 mg. streptomycin every two hours for five days. It was recommended that intrathecal administration of streptomycin should always accompany intramuscular therapy.

One case of *Salmonella* meningitis was treated successfully with streptomycin, although it was suggested that the exact role of the antibiotic in this one patient should be considered as inconclusive. No cases of *E. coli* meningitis in newborns have yet been treated with streptomycin. Since such infections, which are not rare, are generally nonresponsive to the sulfonamides and are almost always fatal, streptomycin may prove effective. In the few patients with tuberculous meningitis, the administration of streptomycin did not appear to help very much.

Howes[48] of Columbia University, studying the treatment of wound infections with streptomycin, observed that 100 micrograms per ml. did not affect the growth of tissue culture at all, whereas 200 micrograms were only moderately inhibitory. At least 14 wounds were sutured with a mixture of 200 units of streptomycin and 5% marfanil, without any infections of the wounds and no untoward reactions. The stability of streptomycin solutions, in contrast with those of penicillin, was believed to be of special significance.

Adequate surgery, followed by streptomycin treatment, will undoubtedly prove highly effective, as suggested by Hirshfeld[48] and by other clinicians.

SUMMARY AND CONCLUSIONS

STREPTOMYCIN, an antibiotic agent produced by certain strains of *Streptomyces griseus*, is the result of an extensive search for an antibiotic agent that would be active against gram-negative bacteria and mycobacteria, be nontoxic to animals, and be efficacious *in vivo*.

It is produced in shaken or stationary cultures and may be easily assayed by the agar diffusion or cup agar dilution or turbidimetric methods. Streptomycin is recovered from the medium by adsorption on charcoal and subsequent elution with dilute acid-alcohol. Concentrated preparations of streptomycin are further purified and finally crystallized as the helianthate or as the reineckate.

Streptomycin is an organic base soluble in water but insoluble in different organic solvents. It is chemically stable and is resistant to microbiological destruction. It is not adsorbed on bacterial cells. The pure base possesses an activity of about one unit per microgram.

Streptomycin is extensively active *in vitro* against gram-negative and gram-positive bacteria as shown in Table II. It is also active against organisms such as *Ps. aeruginosa*, *Serratia marcescens* and *B. mycoides*, which are resistant to streptothricin.

It is bacteriostatic in low concentrations and bactericidal in greater amounts.

Bacterial strains resistant to streptomycin can be produced by growing the cultures in media containing streptomycin. However, the adapted variants may or may not be simultaneously resistant to other antibiotic agents.

The natural sensitivity of an organism is characteristic of a particular strain rather than of a species, different strains varying greatly in this respect.

Streptomycin also exerts a marked bacteriostatic and bactericidal effect upon *Mycobacterium tuberculosis*, especially the human strains. It inhibits related organisms such as *Erysipelothrix muriseptica*, and pathogenic and saprophytic actinomycetes. It is not active against fungi.

TABLE II—RANGE IN SENSITIVITY OF BACTERIA AND ACTINOMYCETES TO BACTERIOSTATIC ACTION OF STREPTOMYCIN

Micrograms of Streptomycin per Milliliter of Suitable Medium Required to Inhibit Growth

ORGANISM	MICROGRAMS	REFERENCES
Aerobacter aerogenes	0.5–2.5	(17), (22)
Bacillus anthracis	0.375	Heilman (48)
B. cereus	0.83	(17)
B. megatherium	0.25–3.0	(17), Heilman (48)
B. mesentericus	1.67	(17)
B. mycoides	0.1–3.8	(17), (22)
B. subtilis	0.12–1.0	(17), (40)
Brucella abortus	0.5–3.75	Reimann (48), Heilman (48)
Br. melitensis	0.5	Slavin (48)
Br. suis	0.5	Reimann (48)
Clostridium butylicum	8.34	(17)
Cl. septicum	> 105	(22)
Cl. sordellii	> 105	(22)
Cl. tetani	> 104	(22)
Cl. welchii	> 104	(22)
Corynebacterium diphtheriae	0.375–3.75	Heilman (48)
Diplococcus pneumoniae	8.0	(22)
Eberthella typhi	1.0–37.5	(22), Heilman (48)
Erysipelothrix muriseptica	2.5	(20)
Escherichia coli	0.3–3.75	(40), Heilman (48)
E. communior	1.0–4.0	(40)
Hemophilus influenzae	1.56–5.0	Heilman (48), Birmingham (48)
H. pertussis	1.25–3.0	Heilman (48), (45)
Listerella monocytogenes	2.5	(17)
Klebsiella ozenae	0.375–1.5	Heilman (48)
K. pneumoniae	0.625–8.0	(25)
Malleomyces mallei	10–> 10.0	Heilman (48)
Mycobacterium avium	10.0	(20)
M. phlei	0.12	(20)
M. tuberculosis, var. hominis	0.15	(20)
Neisseria gonorrheae	5.0	Heilman (48)
N. intracellularis	5.0	Heilman (48)
Pasteurella aviseptica	15.0	Heilman (48)
P. lepiseptica	0.5–2.5	(22), Heilman (48)
P. pestis	0.75–1.5	Heilman (48)
P. tularensis	0.15–0.3	Heilman (48)
Phytomonas pruni	0.25	(17)
Proteus vulgaris	0.4–3.0	(40)
Pseudomonas aeruginosa†	2.5–25.0	(17), (20)
Ps. fluorescens†	12.5	(17)
Sarcina lutea	0.25	(17)
Serratia marcescens	1.0	(17)
Salmonella aertrycke	4.0–10.0	(17), (22)
S. enteritidis	0.5	(22)
S. schottmülleri	2.0	(22)
Salmonella sp.	60.0	Birmingham (48)
Shigella paradysenteriae	0.25–3.75	(22), Heilman (48)
Staphylococcus aureus‡	0.5–> 16.0	(22)
Streptococcus faecalis	50.0	Greey (48)
S. hemolyticus	2.0–> 16.0	(22)
S. lactis	4.0	(22)
S. salivarius	5.0–25.0	Greey (48)
S. viridans	>16	(22)
Vibrio comma	6.0–37.5	Heilman (48)
Actinomyces bovis	3.75	Heilman (48)
Nocardia asteroides	12.5	(20)
N. gypsoides	4.0–12.5	(20)
Streptomyces albus	0.4–1.25	(20)
S. antibioticus	< 0.4	(20)
S. lavendulae	1.25	(20)
Streptomyces sp. 3462	4–12.5	(20)

† Out of a group of *Ps. aeruginosa* and *Ps. flourescens* (Hirshfeld, 48), some required over 256 γ per ml. to inhibit growth.
‡ Some staphylococci have been reported (Hirshfeld, 48) to require over 256 γ per ml. to inhibit growth.

The antibacterial action of streptomycin *in vitro* is inhibited by a low *p*H, by the presence of glucose, by cysteine and 2-aminoethanethiol and to a limited degree by thioglycollic acid.

Animal inoculation studies have established that the toxicity of streptomycin is extremely low. Although some lots produce an unfavorable histamine-like effect, this seems to be a matter of purification of the antibiotic, the available evidence indicating that the histamine-like factor is an impurity.

In vivo streptomycin has successfully controlled experimental infections due to *Salmonella schottmülleri, Pseudomonas aeruginosa, Proteus vulgaris, Shigella gallinarum, Brucella abortus, Klebsiella pneumoniae, Pasteurella tularensis* and *Mycobacterium tuberculosis.* Against the gram-positive *Diplococcus pneumoniae* and *Staphylococcus aureus* protection was afforded by somewhat larger doses. Streptomycin has also protected against spirochetal infections due to *Borrelia novyi* and *Leptospira icterohaemorrhagica.* It is not effective in suppressing avian malaria or in the control of the few virus diseases tried.

In any comparison of the efficacy of streptomycin and penicillin, the very fundamental difference between the streptomycin unit (one microgram of pure base) and the Oxford unit (0.6 microgram of crystalline penicillin) must be appreciated in order to avoid misleading conclusions.

In human beings, streptomycin is rapidly absorbed and excreted in the urine following parenteral administration. It is not absorbed appre-

ciably from the intestine, nor is it destroyed there; in the gut it exerts a marked suppressive effect upon the microbial population. Therapeutic blood and urine levels are readily established and maintained by intramuscular or intravenous injection. By the oral route of administration, streptomycin does not readily enter the blood stream.

Following the oral or parenteral administration of streptomycin, no unfavorable effects have been encountered which could not be attributed largely to the presence of impurities in the preparations.

To date, streptomycin has been administered for infections of the urinary tract, typhoid, brucellosis, *Klebsiella* infections, tularemia, tuberculosis, and wounds. Although the results in some cases have been very encouraging, in others, such as brucellosis and tuberculosis, no definite conclusion may as yet be drawn.

In view of the limited clinical data, a final evaluation of the therapeutic potentialities of streptomycin is impossible at the present time.

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* In view of the overlapping studies of the two antibiotics, all the papers dealing with these two compounds are cited.

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PENICILLIN CUTS MORBIDITY OF SCARLET FEVER OTITIS MEDIA

No deaths and marked reduction of expected morbidity occurred when penicillin was used intramuscularly in treating 511 cases of scarlet fever otitis media, according to a report by Cmdr. C. H. Allman, U. S. N. R. (*J. Am. Med. Assoc.*, 129: 109, 1945).

Of 60 patients with acute mastoiditis in this group, 45% were cured by penicillin and did not require surgery. Excellent results were achieved in all but 4 of 33 patients with scarlet fever mastoiditis which required surgery.

Moreover, Cmdr. Allman believes that the administration of penicillin from the onset of scarlet fever reduces the incidence of ear complications. A study of 600 scarlet fever cases showed that the routine use of penicillin reduced the incidence of acute otitis media from 10.9% to 5.6%.

PENICILLIN IN SALINE CALLED EQUAL TO SPECIAL ORAL PRODUCTS

Serum levels obtained with ordinary penicillin in saline solution given orally are at least as high and as well sustained as with various special oral preparations, tests by Drs. Maxwell Finland, Manson Meads and E. M. Ory of Boston indicate (*J. Am. Med. Assoc.*, 129:315, 1945).

Combinations used for comparison included penicillin sodium with aluminum hydroxide gel; penicillin calcium with shellac, beeswax and cottonseed oil; penicillin calcium in corn oil; and penicillin calcium with a highly soluble binder and buffer. Doses of penicillin dissolved in saline solution, ingested either before or after meals, produced blood levels equal to comparable doses of the special preparations, except possibly when aluminum hydroxide gel was used in addition to the saline solution of penicillin after a meal.

An oral dose of 90,000 units in saline solution one-half hour *before* breakfast regularly gave serum levels comparable to those obtained from 15,000 or 20,000 units given intramuscularly.

In accord with most experiments with oral forms of penicillin, the physicians found that levels obtained when the penicillin was given one-half hour *after* breakfast were very irregular and unpredictable.

Preliminary clinical trial in gonorrhea and pneumococcic pneumonia suggested that oral penicillin therapy is feasible in these infections and should prove effective in other infections in which low doses of parenteral penicillin have proved adequate.

Parenteral penicillin should be used to initiate therapy in all severe infections, the physicians warn, and in those which experience has already shown to require prolonged treatment with large parenteral doses.

Apothecary's Prayer

O GOD, great Master
Of the healing arts,
Bless my slow unwieldy hands;
Make skilled and sensitive
My fingertips for all demands,
As counter for disaster.
Fill my mental starts
With keenness; let me live

That other lives may through
Deft medium of my science,
Pursuance find in health.
Let each capsule that I count
Yield strength rewarding wealth;
Each liquid that I mix anew,
Each ointment for appliance,
In all and each amount

Be healing prayer.
Let me ne'er forget
Thy generous Providence
Held within my trembling hands.
Help me justly execute, dispense
And be cautious of my ware—
And while Life's hour-glass yet
Runs, with the doctor guide its sands.

Place within my heart
Alert and wholesome fear,
Lest I misweigh a single grain,
And Death comes stalking from my shelves.
Make impotent limbs to walk; pain
And sorrow's counterpart
With my potions disappear;
And God, give Hope unto themselves.

—SISTER MARY JUNILLA, O.S.F., Ph.G.

FEDERAL NOTICE ON LABELING FORMULATIONS OF DDT

by W. G. REED

PRODUCTION AND MARKETING ADMINISTRATION, U. S. DEPARTMENT OF AGRICULTURE

Jurisdiction over the labeling and control of insecticides containing DDT is vested in the Department of Agriculture through the Federal Insecticide Act. The following discussion will answer various questions raised by pharmacists on this subject, but it must be borne in mind that laws in your particular state pertaining to toxic insecticides are also applicable.

For additional information concerning formulations, action, uses and toxicity of DDT refer to pages 260 to 265 of the October issue of THIS JOURNAL.

—THE EDITOR

UNDER Section 8 of the Federal Insecticide Act, any insecticide which contains an inert ingredient—that is, one which is not in itself an insecticide—must bear on its label a plain and correct statement of the name and percentage amount of each inert ingredient or, in lieu of this, a plain and correct statement of the name and percentage amount of each of the active ingredients, together with the total percentage of inert ingredients. If the product consists entirely of active ingredients, no ingredient statement is required.

As far as we are now aware, the normal impurities in technical DDT* are all active ingredients within the meaning of the act. Mineral oil, such as kerosene, is also an active ingredient for use as a contact insecticide against the common household insects. Therefore, in general, technical DDT and kerosene solutions of DDT are not required to bear an ingredient statement on their labels. No objection is, however, raised to such a statement as "Active Ingredients 100%."

The emulsifiable products may or may not consist entirely of active ingredients, depending upon the solvent and upon the emulsifier used. If both the solvent and the emulsifier are active and the preparation contains no other ingredient, no ingredient statement is required on the label. On the other hand, if the preparation contains an inert ingredient—for example, if the emulsifier is inert or if there is water present—the label must bear an ingredient statement. The carrier in the powders is usually inert and, therefore, the labels for the powders must also bear an ingredient statement.

There is at the present time no practical method for determining all of the different compounds in technical DDT. In view of this, no objection is raised to considering dichloro diphenyl trichloroethane (which includes 2,2-bis(parachlorophenyl)-1,1,1-trichloroethane and its isomers) as an active ingredient. For an insecticide containing technical DDT as its only active constituent, either of the following forms of ingredient statement, which should appear prominently on the front panel of the label, will be acceptable:

ACTIVE INGREDIENT
Dichloro diphenyl trichloroethane ——%
INERT INGREDIENTS ——%
Total 100%

or

(assuming that the technical DDT has a minimum setting point of 88° C.)

ACTIVE INGREDIENT
Dichloro diphenyl trichloroethane ——%
(DDT—setting point 88° C. minimum)
INERT INGREDIENTS ——%
Total 100%

The correct values are to be inserted in the blank spaces. If other active ingredients are present, the ingredient statement in either case should be changed to show the name and percentage of each of them under the heading "ACTIVE INGREDIENTS."

Efficacy Claims

Insecticides containing DDT are known to be effective against a wide variety of insects but they are not effective against all insects and they are different in their action from some of the common household insecticides. Their labels should clearly state the purposes for which they are intended and give clear and adequate directions for use. When necessary, the dosages

* The term "DDT" refers to the compound 2,2-bis(parachlorophenyl)-1,1,1-trichloroethane, including both the technical grade of this material, minimum setting point 88° C., and the purified grade. Technical DDT, which is the form of this chemical used for most insecticidal purposes except aerosols, consists primarily of 2,2-bis(parachlorophenyl)-1,1,1-trichloroethane, together with impurities, including considerable amounts of isomers and much smaller amounts of other by-products formed in its manufacture.

should be definitely specified. Since different household insects have different habits, the same directions will not be suitable for all uses. The following paragraphs indicate types of directions which will be acceptable:

FLIES, MOSQUITOES AND GNATS.—As little as 1% of DDT in kerosene is eventually effective as a spray for these insects but it is very slow in action. Because of this sluggish action, products consisting of DDT in kerosene cannot be classified as to grade by the Peet-Grady method. Some other toxicant must be added if quick knockdown is desired. The directions for use should provide for closing all doors and windows and thoroughly spraying the product in all parts of the room, particularly toward the ceiling so as to fill the room with a fine mist. The room should be left closed for ten or fifteen minutes after spraying. No claims for lasting or residual effects should be made for such a treatment.

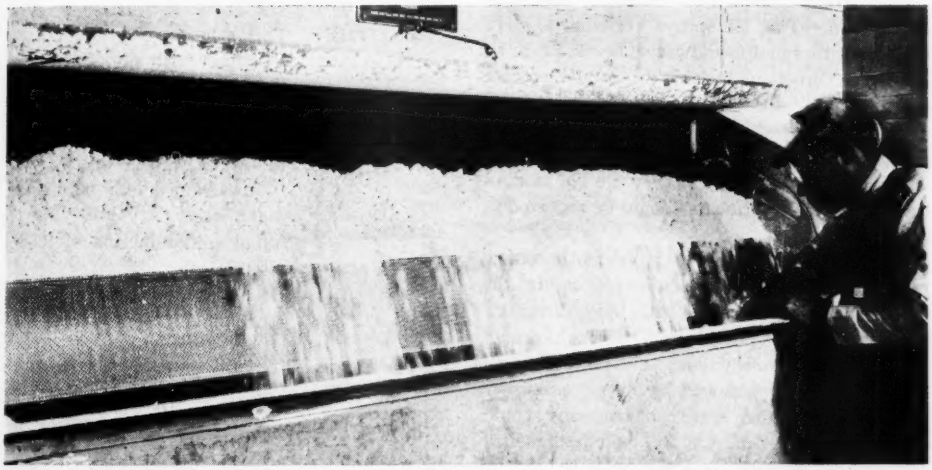
Insecticides containing DDT can also be used for residual effect. A dosage of 200 milligrams of DDT per square foot will give residual effect up to three or four months unless removed by weathering, washing or other means. To obtain such a deposit without runoff, it is usually considered necessary to apply a 5% concentration in oil or water. The directions should provide for thoroughly treating screens, walls, painted woodwork, light fixtures and other places where the insects may alight. For flies and other insects attracted to light, it is most important to cover the spaces toward the light. Since some kinds of mosquitoes seek dark places, directions should provide for treating these hiding places. Screens are subject to weathering and, therefore, directions should provide for re-treating them at frequent intervals.

BEDBUGS.—Sufficient DDT in the form of an oil solution, as a dust, or in an emulsion will be effective as a contact or as a residual poison for bedbugs. The directions should provide for thoroughly treating bedsteads and mattresses, paying particular attention to all hiding places. If a good treatment is given and the residue is left in place, it may be effective for as long as six months.

FLEAS INFESTING PREMISES.—Dusts and oil sprays containing DDT in suitable amounts have been found effective against fleas. Directions should provide for thoroughly spraying or dusting floors, rugs and other flea-infested places. Under ordinary conditions where the residue is not removed, residual action for at least several weeks may be expected.

ANTS IN BUILDINGS.—Oil solutions containing *DDT* should be sprayed so as to hit as many of the ants as possible and to thoroughly wet their runways and the other places which they frequent. Such treatment should give a residual effect for periods up to several weeks.

Dusts containing DDT have shown value against certain species of ants. They should be recommended for use so as to hit as many ants as



DDT pours into barrels as an attendant opens the grinding machine for inspection. U. S. production now stands at more than 3,000,000 pounds per month.

possible and to cover their runways and the places they frequent. If a dust is not effective against all sorts of ants infesting households, this should be made clear.

ROACHES.—Not less than 8% of DDT in a dust, 5% in an oil solution, or 3% in a water spray should be recommended for these insects. The German roach or waterbug is especially difficult to control with insecticides containing DDT. Instructions should provide for treating cracks and crevices in woodwork, dark places behind pipes and all places which roaches infest, hitting as many insects as possible. A thorough treatment may give protection for several weeks but in view of the difficulty in controlling these insects, instructions should be given for repeating the treatment whenever reinfestation occurs.

TICKS IN PREMISES (the brown dog tick which is not known to carry disease).—This tick hides in cracks or crevices of kennels or houses, and directions for use against it should be similar to those for use against roaches. Since the engorged tick is quite resistant, a second treatment may be necessary.

CLOTHES MOTHS AND CARPET BEETLES.—The oil sprays containing DDT will kill clothes moths and carpet beetle larvae by contact. Directions for this use should provide for thoroughly spraying the articles to be protected, paying particular attention to folds and seams, as well as spraying the containers in which they are packed. If they are not in tight containers, the treatments should be repeated at monthly intervals.

DDT is also known to have mothproofing properties—that is, residues remaining in the fabric will give lasting effect. Any directions for such use should provide for a thorough contact with the fibers of the articles to be protected. If the DDT will be removed by dry cleaning, by washing, or by other agents, instructions should be included to repeat the treatment after such dry cleaning, washing, or other exposure.

Caution Statements

The Federal Insecticide Act does not require poison labels on insecticides. However, it does require that the labeling of such products shall not be misleading and recommendations for use are considered misleading if they will result in injury to persons or animals involved. Since there is a certain hazard in the use of preparations containing DDT, a caution labeling for them is recommended. The following suggested cautions have been prepared after consultation with authorities on toxicity:

1. *For straight DDT Technical.*
   CAUTION: DDT is toxic and when in solution can be absorbed through the skin.
   Avoid inhaling dusts, and mist from spray.
   Avoid contamination of foodstuffs.

2. *For Petroleum Oil Solutions containing not more than 25% DDT Technical.*
   CAUTION: This solution if brought into repeated or prolonged contact with skin can cause toxic symptoms.
   Avoid excessive inhalation and skin contact.
   In case of spillage on the skin wash with soap and water.
   Avoid contamination of foodstuffs.
   Do not use on household pets or humans.

3. *For Petroleum Oil Solutions containing more than 25% DDT Technical.*
   CAUTION: This solution if brought into contact with skin can cause toxic symptoms.
   Avoid inhalation and skin contact.
   In case of spillage on the skin wash immediately with soap and water.
   Avoid contamination of foodstuffs.
   Do not use on household pets or humans.

4. *For Emulsions containing not more than 25% DDT Technical.*

   Same as No. 2. above.

5. *For Emulsions containing more than 25% DDT Technical.*

   Same as No. 3 above.

6. *For Combustible Mixtures.*

   Same as above, and add:
   CAUTION: Do not spray into or near fire or open flame.
   Do not smoke while spraying.

7. *For Dust and Powder Formulations.*
   CAUTION: Avoid excessive inhalation.
   Avoid contamination of foodstuffs.

If the preparation contains other hazardous ingredients or solvents, appropriate additional cautions must be added to the foregoing.

It was the opinion of the toxicologists that the white household powders and dusts should be colored. This recommendation for coloration is made solely for the protection of human life, but does not conclude that the product is highly toxic to man to the extent that it requires a poison label with skull and crossbones.

Statements Concerning DDT Content

In view of the great publicity that has been given DDT, there is a tendency to overemphasize references to DDT on the label, as by using it in the name or by printing it in such large letters as to overshadow other reading matter on the label. Such names as "DDT Spray," "DDT Powder" or "Doe's DDT Insecticide" are not acceptable. It is a general rule of labeling that if a name is to be descriptive, it must be completely descriptive. A product containing 5% of DDT in kerosene is not a "DDT Spray" but is a "Kerosene and DDT Spray." A 10% mixture of DDT in clay would be a "Clay and DDT Powder," rather than a "DDT Powder."

If a preparation contains DDT in sufficient amount to be effective against all of the insects named on the label, no objection is raised to a statement that it "Contains DDT," provided the word "Contains" is in the same sized type and equally as prominent as the term "DDT" and that they are not more prominent than the name of the product.

Some preparations are being made by merely adding DDT in small amounts to another insecticide, the DDT being present in too small an amount to be effective against some or all of the insects named. An unmodified statement that the product contains DDT would give the misleading impression that it contains sufficient DDT to be effective against all of the insects named. To avoid such a misleading impression, the label in this case should definitely state the amount of DDT present, if any reference to it is made, as, for example, by stating "Contains ——% DDT," the correct value being inserted in the blank space.

Insecticides containing DDT are of value for many agricultural and other insecticidal purposes. Directions for such uses are not discussed in this trade notice because they have not yet been sufficiently developed. There is, of course, no objection to marketing DDT preparations for other uses for which they are known to be effective, provided they are properly labeled.

EARACHE DROPS FOR LAY USE DEEMED NOT IN PUBLIC INTEREST

Because earache often warns of fulminating infection in the middle ear, the sale of a product for temporary relief of the pain is contrary to public interest, the Food and Drug Administration emphasized in recent trade correspondence (TC-431).

"We are not unmindful of the persuasive reason you advance," the FDA told an inquirer, "in support of your view that earache drops should be made available to relieve pain until a doctor can be consulted. Before entering into this project dealing with earache drops we made a careful survey of the field. Earache, as you know, may be a symptom of a fulminating infection of the middle ear which can progress very rapidly to mastoiditis. It is our considered judgment that because of the need for prompt medical treatment of such involvement of the ear, it is contrary to the public interest to sell a product for the temporary relief of earache.

"Our long experience in the enforcement of food and drug laws convinces us that in a large number of cases the initial alarm of the patient which would prompt him to call a physician immediately would be allayed if through the use of ear drops the pain substantially decreased or disappeared. Because of this conclusion and because of the serious consequences likely to result therefrom, we must take the position that even under the labeling which you propose, the product would be illegal."

STREPTOMYCIN PRODUCTION MEETS ONLY FRACTION OF MILITARY NEEDS

Production of streptomycin in September will probably not total more than 70 ounces but the Army and Navy hoped to double its procurement in October, the Surgeon General of the Army stated in announcing that the armed forces alone could use about 2000 ounces of the new drug per month.

Streptomycin is being used in 30 Army general hospitals and many requests are received for additional supplies to treat urinary and other infections caused by gram-negative bacteria which do not respond to penicillin.

Merck, Upjohn, Abbott and Squibb are the principal manufacturers although other laboratories are in experimental production at pilot plants, according to the Surgeon General.

PHARMACY IN PUERTO RICO

by EDWARD P. CLAUS

UNIVERSITY OF ILLINOIS, COLLEGE OF PHARMACY

ISLANDERS HOLD PHARMACISTS IN HIGH ESTEEM AND SIDE-LINES ARE SCARCE; NEW LEGISLATION BANS NONREGISTERED "PRACTICO"

THE profession of pharmacy in Puerto Rico is as highly esteemed as the professions of medicine and dentistry. The native Puerto Rican considers his pharmacist more than a compounder of prescriptions and a dispenser of sick room supplies since he seeks his advice on public health problems, on disease prevention and on proper methods of sanitation.

The author has recently returned from this West Indies possession of the United States where, for ten months as a member of the teaching staff of the University of Puerto Rico College of Pharmacy, he had the opportunity to observe the status of the profession. Puerto Rico is predominantly Spanish in its language, customs and habits; and as such, it manifests the European influence in its estimation of its pharmacists.

If you visit the average retail pharmacy on the island either in a large city or a small town, you will find no tobacco and candy counter, no massive displays and no soda fountain. The first thing you will notice will be the absence of window displays; in fact, there will probably be no windows. Instead, there may be five or six doorways to admit light and air and the prospective patrons. Only the ultramodern pharmacies in the metropolitan area of San Juan have conventional window displays.

The floors of the pharmacy, as of other business establishments, homes and apartments, are made of varicolored tile set in mosaic patterns. Tile flooring is more a custom of necessity than beauty, for wooden floors are subject to termite attack. Mahogany is the only wood on the island proved to be termite-resistant and is therefore used in making all good grades of furniture. The wall cases of the smaller pharmacies are open, but in the more prosperous establishments products are displayed in mahogany cases protected by sliding glass panels.

The pharmacies are notably clean and orderly. Every one has several boys on duty at all times to maintain this characteristic appearance. These boys also run errands and deliver prescriptions and orders, and the service is prompt and courteous. It is not unusual to find around one of the doorways six or seven bicycles, all of which bear the name of the establishment. During the day and at night the pharmacies are well lighted and use of fluorescent lighting is not uncommon.

The usual profusion of proprietaries and patent medicines, perfumes and cosmetics is present in great quantity. Shelves are well stocked, not only with North American products, but also with those from Cuba, Mexico and South America and of local manufacture. Among the latter are preparations of many medicinal plants about which little is heard in the United States.

The flowers of *Sterculia apetala* (Anacagüitas in Spanish) are prepared as an infusion and then thickened with sugar to a syrupy consistency. This is used as an expectorant. The leaves of *Momordica charantia* (Cundeamor in Spanish) are employed in making an infusion claimed by some physicians to be helpful in the oral treatment of diabetes.

Pharmaceutical manufacturers of North America have prepared special labels for their products, which provide directions and dosage in the Spanish language. Branch offices of these companies are maintained on the island, most of them in San Juan, the largest city. Detailing physicians and contacting wholesale and retail druggists are the important functions of the manufacturers' representatives, all of whom speak both Spanish and English. In fact, some of these men understand French since they occasionally travel to Haiti, Martinique and neighboring islands.

It seems that the bilingual educational system of the island is particularly advantageous to prospective detail men. They are already acquainted with the English language when they come to the United States to observe and study manufacturing methods or to learn the intricacies of salesmanship. Then, after acquiring their training, they are capable of meeting and conversing in Spanish with professional men in practically all the countries of Central and South America.

The prescription department occupies the featured spot in the Puerto Rican pharmacy. Compounding prescriptions and formulas is the essential purpose of the establishment, all other operations assuming second place. Modern methods prevail in most pharmacies and the equipment employed is on a par with that of pharmacies in the United States; but there are still some antiquated procedures in evidence.

In some pharmacies powder papers are cut with scissors from large sheets of paper. Even the pharmacy students must cut their own papers for folding powders and for weighing. Dropping-bottles are still unknown in some parts of the island. Glass bottles in general are scarce and are salvaged from various sources for use in dispensing liquid preparations. The new glass factory, now being constructed, should eliminate this difficulty. In those communities where the people are very poor, small bottles of cough syrups, lotions, stomach remedies, etc., are sold for five or ten cents. Patrons are instructed to return the bottles and receive a refund.

The author has been reliably informed that in a few drugstores in the interior of the island advantage is taken of the superstitious and uneducated natives. In these stores "love potions," "strength mixtures" and "miracle medicines" are sold by unscrupulous operators. Fortunately this practice is gradually being overcome by the inspectors of the Board of Pharmacy and through the efforts of educational leaders and professional organizations.

The great majority of prescriptions are written in the metric system and the titles of the official ingredients are ordinarily written in Spanish although Latin may be used. For instance, a request for Jarabe de Cerezo Silvestre means Syrupus Pruni Virginianae. The influence of North American specific medicines is being manifested and prescriptions are being written for one substance only.

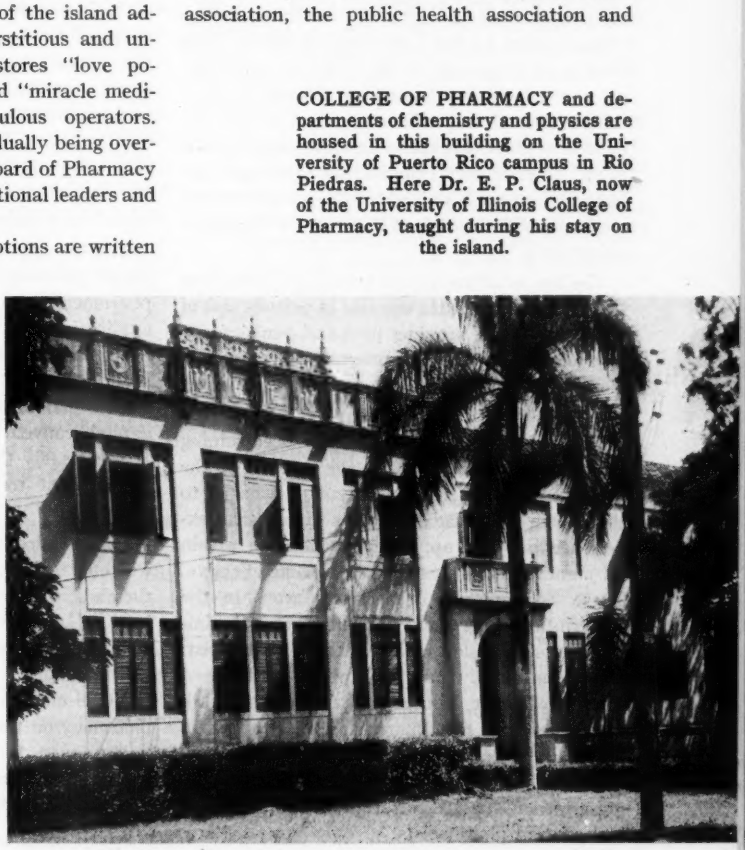
In the past most of the prescription departments were presided over by a registered pharmacist. But since the recently passed Pharmacy Law Number 282 is now in effect, all prescription departments will have at least one registered person in charge.

This pharmacy law was introduced as Pharmacy Bill Number 70 into the Insular House of Representatives by Representative A. L. Monserrate Anselmi, a registered pharmacist and the president of the Colegio de Farmaceuticos, official title of the Puerto Rico pharmaceutical association. The bill was presented to the Insular Senate by Senator Francisco Anselmi, also a registered pharmacist and a graduate of the Temple University School of Pharmacy. After some opposition the bill was passed by both houses and sent to Governor Rexford G. Tugwell for his approval. Considerable pressure was exerted by opponents of the bill, who were led by certain drugstore owners and operators called "practicos."

A practico has served as an apprentice for several years but he is neither a registered pharmacist nor a college graduate. These practicos had previously organized the younger pharmacy apprentices and enlisted their support.

It is interesting to note that the pharmaceutical association, the medical association, the dental association, the public health association and

COLLEGE OF PHARMACY and departments of chemistry and physics are housed in this building on the University of Puerto Rico campus in Rio Piedras. Here Dr. E. P. Claus, now of the University of Illinois College of Pharmacy, taught during his stay on the island.



other professional organizations, as well as the College of Pharmacy of the University of Puerto Rico, all favored passage of the bill.

The author of this article was asked to volunteer his services in the preparation of several memoranda to the governor, in the development of newspaper articles indicating that the public health of the islanders would be more adequately protected by the law, and in writing an editorial for the *Revista Farmaceutica*, official publication of the pharmaceutical association. He also was asked to head a delegation to contact the governor's advisers and to offer information concerning important points of the bill. The support of the AMERICAN PHARMACEUTICAL ASSOCIATION aided materially in obtaining the approval of the governor.

The law does not drastically change the previous law but it does provide for proper enforcement by the Board of Pharmacy rather than by the Board of Public Health. Passage of the new law places the powers of the Board of Pharmacy on a basis equal to those of the boards of most states. The law further provides that a pharmacist, to be registered, must be a graduate of the four-year course offered by the University of Puerto Rico College of Pharmacy or by a college recognized by the American Council on Pharmaceutical Education. He must have acquired at least six months of practical experience and he must pass a Board of Pharmacy examination (although this last requirement is waived for the present for the graduates of the College of Pharmacy of the island university).

The law, of course, covers annual and reciprocal registrations, regulates the sale of poisons and of dangerous drugs, provides fines and punishments for violators, governs the renewal of licenses and includes the other stipulations usually stated in such a measure.

To provide for practicos who have been gaining their livelihood for years in the profession, the law grants the status of assistant pharmacist to those who have had five years of practical experience and who apply for certification within six months of the time the law became effective. These assistant pharmacists may work in the prescription department but only under the immediate supervision of a registered pharmacist. A curious parody on this law was introduced into the Insular Houses by practicos as a bill worded exactly like Pharmacy Bill Number 70 except in those passages which concern the requirement of a registered pharmacist in the prescription department and the requirements for assistant pharmacists.

The College of Pharmacy of the University of Puerto Rico offers a four-year course leading to the degree of Bachelor of Science in Pharmacy. For the most part, the requirements set forth in the Pharmaceutical Syllabus are followed. During the 1944–1945 school year there were about 175 students registered in the college and approximately two-thirds of these were girls. The freshman class numbered 66, largest in the history of the Puerto Rican college, which was founded in 1913.

These Latin boys and girls are serious-minded students and disciplinary problems are rare. Class discussions are active and often heated. The enrollment in the College of Pharmacy has been increasing yearly yet facilities for accommodating these students have not been expanded. Although more students are being granted their collegiate degree each year, there is a scarcity of pharmacists with graduate research training. No graduate courses in pharmacy are offered by the college; in fact, no graduate courses are offered by the University in any subjects other than those for the Master of Arts degree in advanced Spanish. This deficiency cannot be criticized too freely since the University authorities believe in granting undergraduate educational opportunities to as many qualified students as possible and, as a result, the classrooms are overflowing. The educational authorities of the island are confronted with the tremendous task of eliminating illiteracy and at the same time stimulating higher education.

The Colegio de Farmaceuticos is the professional pharmaceutical association in which the pharmacy graduate becomes a member upon application. Its membership at present includes nearly all of the registered pharmacists on the island. It is an active organization, has capable leaders and offers progressive discussions at its annual convention and its district meetings. It was largely through the efforts of this organization that the pharmacy bill was favorably received.

Puerto Ricans are a friendly people. They will offer a warm welcome when you travel on their island and express an interest in their problems. If, when air travel becomes less restricted, you are able to visit Puerto Rico you will find there interesting, enthusiastic and professional-minded pharmacists. The problems of pharmacy on this West Indies island are related to those on the mainland of North America. You will be stimulated in your own professional practice by observing the manner in which they are solving their problems.

INTRODUCING...
NEW PRODUCTS ACCEPTED FOR NNR

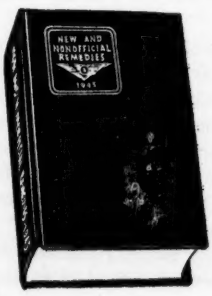
INFORMATION FOR GUIDANCE OF PHARMACISTS AND PHYSICIANS ON DRUGS ACCEPTED BY THE A.M.A. COUNCIL ON PHARMACY AND CHEMISTRY WILL APPEAR REGULARLY IN THIS JOURNAL

THIS issue of the JOURNAL inaugurates a new feature which will present to pharmacists the latest admissions to *New and Nonofficial Remedies* by the Council on Pharmacy and Chemistry of the American Medical Association. By gathering and disseminating information to protect the medical profession in prescribing proprietary medicines and by examining such drugs for compliance with definite rules, the Council has contributed to a more scientific distribution and use of nonofficial products.

New and Nonofficial Remedies has taken its place along with the Pharmacopoeia and National Formulary on the reference shelf in pharmacies as well as in the physician's office. Those who do not have the 1945 revision may obtain a copy for $1.50 from the American Medical Association, 535 N. Dearborn Street, Chicago 10. Each purchaser receives supplements during the year and may request that his name be placed on the mailing list to receive automatically a copy of each annual revision.

Drugs described in N. N. R. stand accepted by the Council on January 1 of the year of publication. Since there is considerable time lag before newly accepted products appear in N. N. R. or its supplements, admissions are announced in the *Journal of the American Medical Association* and now, with the cooperation of the Council on Pharmacy and Chemistry, will be made available promptly to pharmacists through THIS JOURNAL.

Descriptions are based in part on investigations made by, or under, the direction of the Council, but in part also on evidence or information supplied by the manufacturer. Such interested statements are examined critically, however, and are included only if they appear to be in conformity with scientific evidence.



Admission of a drug does not imply a recommendation by the Council, but does mean that no conflict with the following rules has been found:

The term "proprietary article," in this place, shall mean any chemical, drug or similar preparation used in the treatment of diseases, if such article is protected against free competition, as to name, product, composition or process of manufacture, by secrecy, patent, copyright, or by any other means.

Rule 1.—COMPOSITION.—No article will be accepted for inclusion in the book, New and Nonofficial Remedies, or retained therein, unless its composition is published. For simple substances, the scientific name and the chemical formula, rational or structural, if known, should be supplied. For mixtures, the amount of each active medicinal ingredient in a given quantity of the article must be stated. The general composition of the vehicle, its alcoholic percentage, and the identity of the preservatives must be furnished.

Rule 2.—IDENTIFICATION.—No article will be accepted or retained unless suitable tests for determining its composition are furnished to the Council. In the case of chemical compounds, these shall consist of tests for identity and purity. In the case of mixtures, description of methods for determining the amount and strength of the potent ingredients shall be furnished if practicable.

Rule 3.—DIRECT ADVERTISING TO PUBLIC.—No article advertised to the public will be accepted or retained; but this rule shall not apply to: (*a*) disinfectants, germicides and antiseptics, provided the advertising is limited to conservative recommendations for their use as prophylactic applications to superficial cuts and abrasions of the skin and to the mucous surfaces of the mouth, pharynx and nose (but not to those of the eye, and the gastrointestinal and genitourinary tracts) and provided they are not advertised as curative agents; (*b*) liquid petrolatum and simple preparations of liquid petrolatum, agar and simple preparations of agar, and similar preparations which act because of their bulk provided that such lay advertising carries a warning that agar and similar preparations may be harmful in colitis; (*c*) other agents about which the public should be informed which would not lead to harmful self-medication provided (1) they are not advertised as curative agents and provided (2) that advertising to the public does not go beyond that passed by the Council for physicians (Rule 6).

Rule 4.—INDIRECT ADVERTISING TO PUBLIC.—No article will be accepted or retained if the label, package or circular with the package contains the names of diseases, in the treatment of which the article is said to be indicated. The therapeutic indications and properties may be stated, provided such statements do not suggest self-medication. Dosage may be indicated. (This rule shall not apply to remedies with which self-medication is altogether improbable, to vaccines and antitoxins or to directions for administering or applying remedies when similar immediate, heroic treatment is indicated.)

Rule 5.—FALSE CLAIMS AS TO ORIGIN.—No article will be accepted or retained concerning which the manufacturer or his agents make false or misleading statements as to source, raw material from which made, or method of collection or preparation.

Rule 6.—UNWARRANTED THERAPEUTIC CLAIMS.—No article will be accepted or retained concerning which the manufacturer or his agents make unwarranted, exaggerated or misleading statements as to the therapeutic value.

Rule 7.—POISONOUS SUBSTANCES.—The principal label on an article containing "poisonous" or "potent" substances must state plainly the amount of each of such ingredients in a given quantity of the product.

Rule 8.—OBJECTIONABLE NAMES.—Proprietary names for medicinal articles will be recognized only when the Council shall deem the use of such exclusive names to be in the interest of public welfare. Names which are misleading or which suggest diseases, pathologic conditions or therapeutic indications will not be recognized (the provision against therapeutically suggestive names does not apply to serums, vaccines and antitoxins). In the case of pharmaceutic preparations or mixtures the name must be so framed as to indicate clearly the most potent ingredients. Coined names for salts will not be accepted unless such names indicate the components of the salt; coined names for new substances marketed as pharmaceutic preparations will not be accepted unless such names indicate definitely the type or dosage form of the article.

Rule 9.—PATENTED PRODUCTS AND PROTECTED NAMES.—If the article is patented—either process or product, or both—the number of such patent or patents must be furnished to the Council. Furthermore, if the name of an article is registered, or the label copyrighted, the registration (trademark) number and a copy of the protected label should be furnished the Council. In case of registration in foreign countries, the name under which the article is registered should be supplied.

Rule 10.—UNSCIENTIFIC AND USELESS ARTICLES.—No article will be accepted or retained which, because of its unscientific composition, is useless or inimical to the best interests of the public or of the medical profession.

Rule 11.—POLICIES OF FIRMS DETRIMENTAL TO RATIONAL THERAPEUTICS.—The Council will not accept or retain, if already accepted, the articles of a firm if in the opinion of the Council the policies of such a firm are clearly detrimental to the welfare of the public and to medicine.

Nonofficial preparations judged as complying with the above rules are accepted for a period of three years. Previous noncompliance, short of intentional fraud, does not prevent favorable consideration of an article currently in accord with the rules. Accepted products may be reconsidered if there are subsequent infringements of the rules or if information on which acceptance is based proves to be incorrect. After three years, products are readmitted for a like period when re-examination shows that more recent evidence continues to substantiate claims made and that existing rules are still being complied with.

U. S. P. and N. F. drugs are not considered by the Council if they are marketed under the official name or a name which makes their official status evident, and if no unestablished therapeutic claims are made for them, unless it is learned that the medical profession is not fully informed concerning such articles.

The scope of N. N. R. includes simple proprietary substances and their preparations; proprietary mixtures if they have originality or other important qualities which, in the judgment of the Council, entitle them to such place; important, nonproprietary nonofficial articles; simple pharmaceutic preparations; or any other article, the inclusion of which is believed to give useful information to the physician.

Even though a mixture may contain official drugs, it is considered as proprietary by the Council (and therefore requiring consideration for admission) if it contains any proprietary article; if it is marketed under a name which is in any way protected; or if its manufacturer claims for it any unusual therapeutic qualities.

In connection with the rule on nomenclature (No. 8), the Council points out that many of the abuses connected with proprietary medicines arise from "coined" trade names. Such names are not recognized by the Council except in particular instances where their use is in the interest of the public welfare.

No opposition to an arbitrary name for a new product is offered, however, provided that it is not misleading, therapeutically suggestive or otherwise subversive of scientific pharmacy and therapeutics. Proprietary names are not recognized for articles in the U. S. P. or N. F., for those already accepted for N. N. R., or for unessential modifications of such articles.

Neither are proprietary names recognized for substances that have been described in medical

and pharmaceutical publications, except in connection with fundamentally important new discoveries relating to drugs which had become practically obsolete.

The Council has also stated that the subterfuge of obtaining proprietary rights over an official or established nonproprietary product by introducing unessential modifications leads to obvious abuses and confusion, and such articles will not be admitted to *New and Nonofficial Remedies*.

For further background information on the application of Council requirements in connection with listings and reports which will appear in THIS JOURNAL from time to time, pharmacists may obtain without charge a copy of the booklet "Official Rules of the Council on Pharmacy and Chemistry" on request to the Secretary, Council on Pharmacy and Chemistry, American Medical Association, 535 N. Dearborn Street, Chicago 10.

NEW AND NONOFFICIAL REMEDIES

recently accepted by the

COUNCIL ON PHARMACY AND CHEMISTRY
AMERICAN MEDICAL ASSOCIATION

HEXAVITAMIN TABLETS.—Hexavitamin Tablets contain in each tablet not less than 2,500 U. S. P. units of vitamin A from natural (animal) sources, 200 U. S. P. units of vitamin D from natural (animal) sources, or as activated ergosterol or activated 7-dehydrocholesterol, 37 mg. of ascorbic acid, 1 mg. of thiamine hydrochloride, 1.5 mg. of riboflavin and 10 mg. of nicotinamide.—U. S. P.

For description and standards see the U. S. Pharmacopœia XII First Bound Supplement under Tabellae Hexavitaminarum.

Actions, Uses and Dosage.—For prophylaxis and treatment of conditions arising from deficiency of vitamins A and D and ascorbic acid, thiamine, riboflavin and nicotinic acid. See articles on the various vitamins concerned (N. N. R. 1944, pp. 604–625).

INTERNATIONAL VITAMIN CORPORATION, NEW YORK

Tablets Hexavitamin: Each tablet contains 2500 U. S. P. units of vitamin A, 200 U. S. P. units of vitamin D, 37 mg. of ascorbic acid, 1 mg. of thiamine hydrochloride, 1.5 mg. of riboflavin and 10 mg. of niacin amide.

NICOTINAMIDE (See New and Nonofficial Remedies 1944, p. 617).

The following additional dosage form has been accepted:

GEORGE A. BREON & CO., INC., KANSAS CITY, MO.

Tablets Nicotinamide: 100 mg.

TRIASYN B.—"Triasyn B Capsules and Tablets contain in each capsule or tablet not less than 1 mg. of thiamine hydrochloride, 1.5 mg. of riboflavin and 10 mg. of nicotinamide."—U. S. P.

For description and standards see U. S. Pharmacopœia XII First Bound Supplement under Capsulæ Triasyni B and Tabellæ Triasyni B.

Actions, Uses and Dosage.—For prophylaxis and treatment of conditions arising from deficiency of thiamine, riboflavin and nicotinic acid. See articles on the various vitamins concerned (N. N. R. 1944, pp. 606–615).

PREMO PHARMACEUTICAL LABORATORIES, INC., NEW YORK

Tablets Triasyn B: Each tablet contains 1 mg. of thiamine hydrochloride, 1.5 mg. of riboflavin and 10 mg. of nicotinic acid amide.

Capsules Triasyn B: Each capsule contains 1 mg. of thiamine hydrochloride, 1.5 mg. of riboflavin and 10 mg. of nicotinic acid amide.

ALUMINUM HYDROXIDE GEL (See New and Nonofficial Remedies, 1944, p. 382).

The following dosage forms have been accepted:

BARLOW-MANEY LABORATORIES, CEDAR RAPIDS, IOWA

Aluminum Hydroxide Gel: 480 cc. bottles. Contains the equivalent of 3.6 to 4.4 per cent of aluminum oxide (U. S. P. XII).

THE UPJOHN COMPANY, KALAMAZOO, MICH.

Aluminum Hydroxide Gel: 240 cc. and 3,840 cc. bottles. Contains the equivalent of 3.6 to 4.4 per cent of aluminum oxide (U. S. P. XII).

E. R. SQUIBB & SONS, NEW YORK

Aluminum Hydroxide Gel: 360 cc. and 3,840 cc. bottles. Contains the equivalent of 3.6 to 4.4 per cent of aluminum oxide (U. S. P. XII).

SYRINGE APPLICATORS FOR CONTRACEPTIVE JELLIES AND CREAMS (See New and Nonofficial Remedies, 1944, p. 341).

The following product has been accepted:

CONTRA CREME AND DIAPHRAGM CO., SEVERNA PARK, MD.

Contra Applicator: A transparent plastic syringe threaded at the blunt, intravaginal end, to screw onto the tubes of Contra Creme, to permit filling by compression of the tube. The full capacity is 5 cc., the recommended dose.

EPHEDRINE SULFATE (See New and Nonofficial Remedies, 1945, p. 270).

The following dosage form has been accepted:

THE WM. S. MERRELL CO., LOESER LABORATORY DIVISION, CINCINNATI

Solution Ephedrine Sulfate: 0.048 Gm. in 1 cc. ampuls.

DIETHYLSTILBESTROL (See New and Nonofficial Remedies, 1944, p. 417).

The following dosage form has been accepted:

WALLACE & TIERNAN PRODUCTS, INC., BELLEVILLE, N. J.

Tablets Diethylstilbestrol: 0.1 mg., 0.5 mg. and 1.0 mg.

NEO-SYNEPHRINE HYDROCHLORIDE (See New and Nonofficial Remedies, 1944, p. 284).

The following additional dosage form has been accepted:

FREDERICK STEARNS & COMPANY, DETROIT

Solution Neo-Synephrine Hydrochloride, 1 per cent: 1 cc. ampuls and 5 cc. vials. Neo-synephrine hydrochloride 1 per cent, sodium bisulfite 0.10 per cent and sodium chloride 0.6 per cent.

MENADIONE (See New and Nonofficial Remedies, 1944, p. 638).

The following dosage forms have been accepted:

ENDO PRODUCTS, INC., RICHMOND HILL, N. Y.

Tablets Menadione: 1 mg. and 2 mg.

Solution Menadione (in corn oil) 2 mg. per 2 cc.: 2 cc. ampuls. Each cubic centimeter contains 1 mg. menadione.

CHLOROAZODIN (See New and Nonofficial Remedies, 1944, p. 125).

The following additional dosage form has been accepted:

WALLACE & TIERNAN PRODUCTS, INC., BELLEVILLE, N. J.

Surface Active Saline Mixture of Azochloramid: 4.7 Gm. envelopes. Each envelope containing azochloramid 0.14 Gm., sodium tetradecyl sulfate 0.47 Gm. and buffered saline mixture 4.09 Gm. for the preparation of 473 cc. of isotonic solution.

PENICILLIN (See Supplement to New and Nonofficial Remedies, 1944, p. 18).

The following dosage forms have been accepted:

HEYDEN CHEMICAL CORPORATION, NEW YORK

Penicillin Calcium Salt: 100,000 Oxford unit or 200,000 Oxford unit ampuls or vials.

MCNEIL LABORATORIES, INC., PHILADELPHIA

Penicillin Sodium: 100,000 Oxford units in 20 cc. vials.

CARROLL DUNHAM SMITH PHARMACAL COMPANY, ORANGE, N. J.

Penicillin Sodium Salt: 20 cc. vial containing 100,000 Oxford units, packaged with a 20 cc. vial of isotonic solution of sodium chloride.

THE WARREN-TEED PRODUCTS COMPANY, COLUMBUS, OHIO

Penicillin Sodium Salt: 100,000 Oxford unit vials.

COMMERCIAL SOLVENTS CORPORATION, NEW YORK

Penicillin Sodium Salt: 100,000 Oxford unit vials.

Penicillin Calcium Salt: 100,000 Oxford unit vials.

SULFADIAZINE (See New and Nonofficial Remedies, 1944, p. 178).

The following dosage form has been accepted:

WYETH, INC., PHILADELPHIA

Tablets Sulfadiazine: 0.5 Gm.

CONTRACEPTIVE JELLIES AND CREAMS (See New and Nonofficial Remedies, 1944, p. 339).

The following dosage form has been accepted:

CONTRA CREME AND DIAPHRAGM CO., SEVERNA PARK, MD.

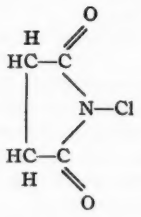
U. S. trademark 355,838.

Contra Creme: A stearic acid cream having a *p*H of 7.3, packaged from the formula:

Phenylmercuric acetate	0.06%
Triethanolamine	0.06
Glycerin	2.5
Glycol monostearate	3.5
Stearic acid	12.0
Distilled water to make	100.00

Dosage.—An applicator which is included in the package is attached to the tube and half filled with the creme. The contents of the applicator are then inserted carefully into the vagina.

SUCCINCHLORIMIDE.—N - chlorosuccinimide. The chlorinated imide of succinic acid.—$C_4H_4O_2NCl$.—M. W. 133.54. Succinchlorimide yields not less than 25.0 per cent nor more than 26.6 per cent of active chlorine.



Actions and Uses.—Succinchlorimide is proposed for use in disinfection of water. Data were submitted showing that succinchlorimide will disinfect water containing Escherichia coli, Eberthella typhi, Salmonella paratyphi A and B, Vibrio cholerae and Shigella dysenteriae within twenty minutes in dilution of 11.6 parts per million (approximately 1:100,000).

Dosage.—For the disinfection of water, 11.6 mg. of succinchlorimide per liter.

Tests and Standards.—

Succinchlorimide occurs as a white to yellowish white powder possessing a relatively strong odor of chlorine. It is sparingly soluble in benzene and in chloroform; slightly soluble in ether. Its solubility in water approximates 1.6 Gm. per hundred cubic centimeters at 25 C. The *p*H of a saturated aqueous solution of succinchlorimide is about 4.0. Succinchlorimide begins to sublime at about 127 C. and melts at from 147 to 150 C.

Although it appears to be relatively stable toward light and air at ordinary temperatures, succinchlorimide should be packaged in air tight, light resistant containers.

Place a few crystals of succinchlorimide in a test tube and

add 2 cc. of sodium iodide solution and 1.0 cc. of chloroform: a purple color develops in the chloroform layer.

To 5 cc. of a saturated aqueous solution of succinchlorimide, acidified with diluted sulfuric acid, add 5 cc. of ethyl acetate and 1.0 cc. of sodium thiosulfate solution. Shake the mixture vigorously for a short time and transfer the layer of ethyl acetate to a watch glass; evaporate the ethyl acetate slowly to dryness and collect the resulting white residue: the succinimide obtained melts at 124 C. Heat a small amount of the succinimide obtained with ten to twenty times its amount of zinc dust contained in a test tube. When distillation begins, place a pine splint which has been soaked for thirty seconds in hydrochloric acid in the fumes: a red color develops in the splint.

Ignite about 2.0 Gm. of succinchlorimide, accurately weighed, until it is charred. Moisten the residue, after cooling, with a few drops of sulfuric acid and reignite to constant weight: the residue is not more than 0.15 per cent.

Ash about 1.0 Gm. of succinchlorimide, accurately weighed, as just directed. Treat the residue with 10 cc. of diluted hydrochloric acid and heat on the steam bath to effect solution of the residue. Dilute the solution to a volume of 25 cc. and complete the test for heavy metals as described in the U. S. P. XII, page 586: the darkening produced corresponds to not more than 1 part per million of lead.

Dissolve about 0.15 Gm. of succinchlorimide, accurately weighed, in 100 cc. of water contained in an iodine flask. Add 3 Gm. of potassium iodide and 10 cc. of dilute sulfuric acid. Stopper the flask, seal the stopper with a known amount of tenth-normal sodium thiosulfate solution and allow to stand five minutes with occasional swirling. Loosen the stopper, allowing the thiosulfate solution to run into the iodine flask; wash the stopper and neck of the flask with 5 cc. of carbon tetrachloride followed by water, and titrate with more tenth-normal sodium thiosulfate to the disappearance of color in the carbon tetrachloride layer. As the end point is approached it is necessary to stopper the flask and shake it frequently and vigorously, with care to avoid loss of contents. Each cubic centimeter of tenth-normal sodium thiosulfate is equivalent to 0.001773 Gm. of active chlorine. The active chlorine content of succinchlorimide is not less than 25.0 per cent nor more than 26.6 per cent.

NATIONAL ANILINE DIVISION, ALLIED CHEMICAL & DYE CORP., NEW YORK.

Succinchlorimide: Bulk.

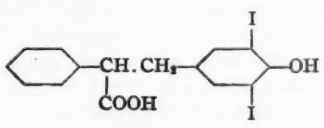
GLOBIN INSULIN WITH ZINC (See Supplement to New and Nonofficial Remedies, 1944, p. 31).

The following additional dosage form has been accepted:

BURROUGHS WELLCOME & CO., INC., NEW YORK

Globin Insulin with Zinc: 10 cc. Each cubic centimeter contains 40 units; 0.18 per cent W/V cresol as preservative.

PRIODAX.—β(4-hydroxy-3-5-diiodophenyl)-α-phenyl-propionic acid.—$HOC_6H_2I_2.CH_2.C_6H_5$-(CH)COOH.—M. W. 494.1. Priodax contains 51.37 per cent of iodine.



Actions and Uses.—Priodax is used as a medium for cholecystography. It is claimed to cause less nausea, vomiting and diarrhea than tetraiodophenolphthalein. The drug is excreted primarily through the kidneys.

Priodax is contraindicated in acute nephritis, uremia and acute disorders of the gastrointestinal tract. Side effects that may be encountered occasionally include pain on urination, nausea, vomiting, diarrhea, griping, headache, sensation of burning in the esophagus, generalized itching, dryness of the mouth, general weakness and flatulence.

Dosage.—The average adult dose is 3 Gm., although more may be given. The patient swallows the drug during or after a light fat-free meal in the late afternoon. Nothing is then eaten until the roentgenologic examination is completed the next morning.

Tests and Standards.—

Priodax occurs as a white or faintly yellowish, practically odorless and tasteless powder; soluble in alcohol and ether; slightly soluble in benzene and chloroform; soluble in both alkali carbonate and hydroxide solutions; insoluble in water. Priodax melts at 157 to 162 C., with decomposition.

Shake about 0.2 Gm. of priodax with 2 cc. of water and 2 cc. of chloroform: the chloroformic layer remains colorless (*absence of free iodine*).

Place about 0.3 Gm. of priodax in a 50 cc. glass stoppered cylinder, add 30 cc. of water, shake the contents for five minutes, filter through paper: separate portions of 10 cc.; each of the filtrate yield a very faint opalescence with 0.5 cc. diluted nitric acid and 0.5 cc. silver nitrate solution (*soluble halides*); no coloration or precipitation on saturation with hydrogen sulfide (*salts of heavy metals*).

Dry about 0.5 Gm. of priodax, accurately weighed, to constant weight over sulfuric acid: the loss in weight should not exceed 0.1 per cent. Incinerate 0.5 Gm. of priodax, accurately weighed, in a platinum crucible: the residue does not exceed 0.1 per cent. Transfer about 0.25 Gm. of priodax to a bomb tube; determine the iodine content by the Carius method: the amount of iodine found corresponds to not less than 50 per cent nor more than 52 per cent, when calculated to the dried substance.

SCHERING CORPORATION, BLOOMFIELD, N. J.

Tablets Priodax: 0.5 Gm.

VETERANS' AFFAIRS COMMITTEE SETS UP STEERING GROUP

To expedite contacts of the Committee on War Activities and Veterans' Affairs with the various governmental agencies during the reconversion period, a subcommittee or steering committee has been appointed which will be in a position to act promptly on all matters involving no new expressions of policy.

The new steering committee consists of Dr. A. G. DuMez representing the American Association of Colleges of Pharmacy, George H. Frates representing the National Association of Retail Druggists and Dr. Robert P. Fischelis representing the AMERICAN PHARMACEUTICAL ASSOCIATION.

A.PH.A. ARTICLE IN AAAS BULLETIN

Information on the organization and activities of the AMERICAN PHARMACEUTICAL ASSOCIATION was presented to some 27,000 persons in related professions and sciences through an article in the *Bulletin of the American Association for the Advancement of Science* for August. The material was contributed by the A. PH. A. secretary, Dr. Robert P. Fischelis.

J. L. ROSIN WINS REMINGTON MEDAL

CONTRIBUTIONS to scientific pharmacy and the development of drug standards have won the Remington Medal for Joseph Rosin, pharmaceutical chemist of Plainfield, N. J., the New York branch of the AMERICAN PHARMACEUTICAL ASSOCIATION has announced.

Mr. Rosin becomes the twenty-fourth Remington medalist, the honor being conferred each year upon the person whose work during the preceding year, or culminating over a period of years, is judged most important to American pharmacy. The gold medal commemorates Joseph P. Remington, nineteenth-century pharmacist who made many contributions to research, education and to the pharmaceutical literature.

In naming Mr. Rosin to receive the medal, the Committee on Award cited his work as "the foremost American authority on chemical reagents" and stated that the Pharmacopœia and National Formulary "are today more indebted to Mr. Rosin for the excellent quality of their chemical standards than to any other person who has participated."

JOSEPH L. ROSIN

He first participated in this important work in 1910, and for the past fifteen years has been a member of the U. S. P. Committee of Revision and several subcommittees. Mr. Rosin has been largely responsible for drawing the official requirements for such important drugs as the sulfonamides and vitamins.

Upon learning of the award, Dr. E. Fullerton Cook, chairman of the Pharmacopœia, said, "I know of no one more deserving of pharmacy's highest honor. Mr. Rosin has contributed more than any other single individual to the standards for medicinal chemicals. If Dr. Remington and Dr. Rosengarten, with whom he collaborated in his early years on the U. S. P., were able to share in thus honoring Mr. Rosin, they would be two of the happiest men alive," he added. "They had the very highest regard for him and for his work."

The Remington medalist is author of the book, *Reagent Chemicals and Standards*, and is largely responsible for the *Merck Index*. In addition to work on official drug standards, Mr. Rosin has been active on the American Chemical Society's Committee on Analytical Reagents, and is the author of a number of papers on chemical and pharmaceutical subjects.

Russian born, Mr. Rosin came to the United States in his youth and studied chemistry at the University of Pennsylvania. After graduation in 1909 with the highest honors in chemistry, including membership in Sigma Xi Society, he was employed by Powers-Weightman-Rosengarten Company, becoming chief chemist four years later. When the firm was absorbed by Merck & Co., Inc., Mr. Rosin was named vice-president and chemical director of Merck. He is serving his nineteenth year in this capacity.

Mr. Rosin holds membership in the AMERICAN PHARMACEUTICAL ASSOCIATION, American Chemical Society, American Institute of Chemists, American Institute of Chemical Engineers, London Chemical Society, Sigma Xi Society, and is a member of the Committee of Revision of the Pharmacopœia. In 1925 the Philadelphia College of Pharmacy and Science recognized his many contributions to the profession by conferring upon him the honorary degree of Master of Pharmacy, and he has been a trustee of this institution for the past nine years.

LILLY'S
DIGEST OF OPERATING STATEMENTS

AVERAGE sales in retail pharmacies during 1944 reached an all-time peak of $52,297. There was a comparable increase in operating expenses but profit rates continued high supported by an upward trend in prescription practice. This optimistic picture is based on a study of 1056 operating statements just released by Eli Lilly and Company.

With sales given as 100%, the average of all costs and profits in 1944 and 1943 are shown in Table 1.

Profit rates did not quite keep pace with the increase in average sales, averaging 9.8% net profit compared with 9.9% in 1943. Except for pharmacies of smallest total sales volume, the proportion with above-average profits varies little between different sizes of pharmacies, as brought out in Table 2. The generally unsatisfactory results for the smallest-sized pharmacies again emphasizes the importance of a good location in which to open or purchase a pharmacy.

For 1944 the average costs of stock, 67.5%, were almost exactly the same as in the previous year. Among the 1056 pharmacies there was more variation from this average than from any other cost figure. Since costs of stock amount to more than two-thirds of the total receipts, the Lilly report emphasizes that if this cost is very much above average, net income will be greatly reduced.

TABLE 1: AVERAGE COSTS AND PROFITS OF PHARMACIES IN 1944 AND 1943

	1944		1943	
Sales		$52,297—100.0%		$46,916—100.0%
Cost of goods sold		35,283— 67.5%		31,616— 67.4%
Gross margin		$17,014— 32.5%		$15,300— 32.6%
Expenses:				
Proprietor's or manager's salary	$4182—8.0%		$3753—8.0%	
Employees' wages	3660—7.0%		2815—6.0%	
Rent	1308—2.5%		1410—3.0%	
Heat	215—0.4%		235—0.5%	
Light and power	260—0.5%		280—0.6%	
Taxes (except on building, income and profit) and licenses	425—0.8%		280—0.6%	
Insurance	157—0.3%		141—0.3%	
Interest paid	52—0.1%		95—0.2%	
Repairs	155—0.3%		95—0.2%	
Delivery	55—0.1%		94—0.2%	
Advertising	262—0.5%		188—0.4%	
Miscellaneous	702—1.3%		816—1.7%	
Estimated total depreciation except on buildings	265—0.5%		280—0.6%	
Bad debts charged off	55—0.1%		48—0.1%	
Telephone	156—0.3%		142—0.3%	
Total expenses		$11,909— 22.7%		$10,672— 22.7%
Net profit		$ 5,105— 9.8%		$ 4,628— 9.9%
Value at cost of merchandise stock		$ 7,926		$ 6,363
Annual rate of turnover of merchandise stock		4.5 times		5.0 times

Some pharmacists seek to reduce average costs of stock by taking advantage of discounts and other allowances which add to their gross margins. On the other hand, quantity buying increases the amount of money invested. The Lilly report indicates that there is no great difference in the proportion of pharmacies with above-average profits per dollar of sales between those with large stocks and slow turnover and those with smaller stocks and more rapid turnover.

TABLE 2: COMPARISON, BY SIZE OF PHARMACY, OF NET PROFITS EARNED IN 1944 IN 1056 PHARMACIES

	Under $10,000	$10,000 to $20,000	$20,000 to $30,000	$30,000 to $50,000	$50,000 to $100,000	Over $100,000	Average
Number of Pharmacies of Each Size	15	112	171	350	321	87	1,056
Operating at a loss.....	20%	5%	5%	3%	3%	6%	4%
Net profit less than 2% of sales.....	0%	11%	8%	7%	7%	2%	7%
Net profit 2% to 4%.....	14%	10%	14%	12%	15%	17%	14%
Net profit 5% to 9%.....	33%	21%	31%	30%	31%	33%	30%
Net profit 10% or over.....	33%	53%	42%	48%	44%	42%	45%

Higher gross margins, typical of pharmacies with the larger stocks, did not result in any general tendency toward higher net profits per dollar of sales. Purchases for more than current needs appeared to add extra hazards to the operation of a pharmacy and greatly reduced the likelihood of obtaining satisfactory profits.

The average value at cost of stock on hand in the pharmacies included in the study was $7926, or almost a 25% increase over 1943. The average increase in sales per pharmacy was only a little over 11%.

This trend, it is pointed out, is particularly dangerous in these times. Much of this excess stock will be in the hard-to-sell category. Pharmacists with excess stock on hand should take an accurate inventory, then give immediate attention to disposing of dead stock. By starting a buying budget further excessive purchasing can be avoided. The annual Lilly studies have shown that the most common cause of failure in retail pharmacies is ineffective control of stock purchases.

TABLE 3: AVERAGE NET PROFIT PER DOLLAR INVESTED IN ALL STOCK OF THE PHARMACY IN RELATION TO PRESCRIPTION VOLUME

	1940	1941	1942	1943	1944
Pharmacies compounding:					
1 to 5 prescriptions daily.....	21¢	32¢	43¢	52¢	56¢
5 to 10 prescriptions daily.....	27¢	34¢	45¢	56¢	56¢
10 to 20 prescriptions daily.....	36¢	46¢	51¢	70¢	62¢
20 to 40 prescriptions daily.....	43¢	43¢	57¢	69¢	75¢
40 up prescriptions daily.....	27¢	25¢	50¢	$1.02	75¢

Prescription revenues, 13.6% of total sales, increased more, proportionately, in 1944 than total sales. Average prescription receipts were 11% above those of 1943, totaling $6962 for the average of 6343 prescriptions. Table 3 shows that as the number of prescriptions filled increases there is a substantial increase, on the average, in the net profit per dollar invested in all stock of the pharmacy. Moreover, as prescription volume increases, the ratio of prescription-sales dollar to each dollar invested in prescription stock mounts rapidly.

The fact that renewals account for about 40% of the prescriptions filled indicates that the pharmacist who does not keep a careful record of the number of refills is apt to underestimate the importance of his prescription laboratory as a source of income.

In analyzing the records of 457 pharmacies, whose records were sufficiently complete to show seasonal prescription variations, it was brought out that the number of prescriptions filled in the summer months was scarcely 25% less than it was in a midwinter month such as January.

Individual studies of the 1056 pharmacies revealed that variations from the over-all average of costs, margins and profits parallel, in general, differences in the size of pharmacies and the size of cities in which they are located. Five tables were therefore prepared showing the usual costs, margins and profits of the 1056 pharmacies arranged by size of pharmacy and size of city. These are included in the complete Digest which

is available without charge from Eli Lilly and Company, Indianapolis 6, Ind.

As a challenge to ambitious and alert pharmacists, the following table (No. 4) of goal figures was prepared from data actually reported by extraordinarily successful pharmacies.

TABLE 4: GOAL FIGURES—COSTS AND EXPENSES OF PHARMACIES WITH ABOVE-AVERAGE PROFITS IN 1944

(Figures are per cent of net sales)

	Under $10,000	$10,000 to $20,000	$20,000 to $30,000	$30,000 to $50,000	$50,000 to $100,000	Over $100,000
Sales	$8000—100%	$15,000—100%	$25,000—100%	$40,000—100%	$75,000—100%	$150,000—100%
Cost of stock sold	4800— 60%	9,000— 60%	16,250— 65%	26,000— 65%	48,750— 65%	97,500— 65%
Gross margin	$3200— 40%	$ 6,000— 40%	$ 8,750— 35%	$14,000— 35%	$26,250— 35%	$ 52,500— 35%
Proprietor's salary	$1280— 16%	$ 1,500— 10%	$ 1,750— 7%	$ 2,800— 7%	$ 3,750— 5%	$ 7,500— 5%
Employees' salaries	160— 2%	450— 3%	750— 3%	1,200— 3%	3,750— 5%	9,000— 6%
Rent	160— 2%	300— 2%	500— 2%	800— 2%	1,500— 2%	3,000— 2%
Other expenses	400— 5%	600— 4%	1,000— 4%	1,600— 4%	2,250— 3%	4,500— 3%
Total expenses	$2000— 25%	$ 2,850— 19%	$ 4,000— 16%	$ 6,400— 16%	$11,250— 15%	$ 24,000— 16%
Net profit	$1200— 15%	$ 3,150— 21%	$ 4,750— 19%	$ 7,600— 19%	$15,000— 20%	$ 28,500— 19%

STATE SECRETARIES HOLD MEETING

TWENTY-SEVEN states were officially represented at the 1945 Conference of State Pharmaceutical Association Secretaries held at the Edgewater Beach Hotel September 12 to 14, inclusive. The conference opened with a dinner sponsored by Editor John McPherrin of *American Druggist* and a cocktail party given by Secretary Joseph Shine of the Illinois Pharmaceutical Association on the evening of September 12. The entire program was devoted to round-table discussions which may be summarized under the following topics:

Modernization of pharmacies as to equipment and design; public and professional relations; activities in behalf of returning service men and women; the trend of hours and pay for pharmacists in the postwar period; refresher courses for pharmacists and returning soldiers and sailors; employer and employee relations; preparation against proposed revisions of Pharmacy Acts which may weaken the whole structure upon which professional pharmacy rests; what to do about the regulation of sale of dangerous drugs, new drugs, poisonous drugs, and insecticides with special reference to DDT; modernization of pharmacy laws and ways and means of protecting the public against the distribution of drugs without adequate supervision; Pharmacy Week and other professional promotions; business problems such as federal tax repeals and collective bargaining bills; the possibility of working out a system of coordination of dues of national and state organizations.

Secretary Fischelis of the A. PH. A. and Secretary Dargavel of the N. A. R. D. frankly discussed the relations of the national associations with the Conference of State Secretaries and there was a clarification of a number of problems which had engaged the interest of all groups. It was brought out clearly that the Conference of Secretaries is expected to continue to be just what its name implies—a conference. It will not attempt to supersede any other organization, but will offer recommendations to the national associations on questions which properly come before the state association secretaries in the regular order of their activities.

In line with this procedure the Conference adopted a series of recommendations and resolutions including the following:

1. A pledge of wholehearted support to the 8th War Loan Victory Drive.
2. A suggestion that all state pharmaceutical associations plan to synchronize their legislative programs in behalf of uniform pharmacy laws.
3. A pledge of full cooperation in support of the programs of the AMERICAN PHARMACEUTICAL

ASSOCIATION and the National Association of Retail Druggists.

4. A suggestion that all state pharmaceutical associations give consideration to the organization of a council of trade associations.

5. A request that the national associations use their influence to secure the repeal of the 20% federal tax, or insist that such tax be collected from the source of supply and not from the consumer.

6. Calling attention to the necessity for improving public relations by modernization of pharmacies and the appointment of public relations committees.

7. Extension of interprofessional relations programs by the organization of allied health councils in the various states.

8. Cooperation with the Committee on Status of Pharmacists in the Government Service to further the interests of the Pharmacy Corps in both Army and Navy.

9. Alertness to the activities of cooperatives and dissemination of information regarding them.

10. Fostering improved employee-employer relations for mutual benefit and the building of the kind of prestige which will attract the highest type of student to courses in pharmacy.

11. Appointment of a committee to discusss with officials of the A. PH. A. and N. A. R. D. the feasibility of a single payment dues plan to cover the national and state organizations.

12. An expression of appreciation of the work of George Bender, retiring editor of the *N. A. R. D. Journal.*

The Conference elected Jack Lynch of Oregon to succeed Jess Slocumb of Minnesota as president. Clara Miller of Kansas was re-elected secretary-treasurer. Other officers are E. M. Josey, Kentucky, first vice-president; J. J. Debus, New Jersey, second vice-president; and J. L. Hayman, West Virginia, delegate to the A. PH. A. House of Delegates. The following were elected to the Executive Committee: Victor Keys, Ohio; Thelma Morris Coburn, Alabama; Hugh Tyler, Iowa; Tom Sharp, Tennessee; and Nicholas Gesoalde, New York.

USE OF BORIC ACID DISCOURAGED BECAUSE OF TOXIC NATURE

"Use of boric acid preparations should be discouraged because of their limited usefulness and the real dangers of their accidental and intentional use," says Dr. E. H. Watson of the University of Michigan Medical School, pointing out that "the medical profession as a whole probably puts unwarranted confidence in boric acid preparations and is likely to forget that boric acid is a poison" (*J. Am. Med. Assoc.*, 129:333, 1945).

A search of the medical literature revealed many instances of accidental poisoning with boric acid, including its calculated use in ointment and powder form. Fatal poisonings have been reported following the placing of boric acid powder into wounds and boric acid solution into the bladder, the empyema cavity, the bowel, and in the stomach during gastroscopy. Other deaths have occurred when boric acid was accidentally administered in some form in food.

"When a drug can be shown to be almost entirely ineffective and at the same time dangerous even when used in ordinary ways," Dr. Watson commented, "it is time to remove that drug from general use as rapidly as possible. Boric acid is such a drug."

A. PH. A.—N. A. R. D. CONFERENCE

The third annual joint conference of the A. PH. A. Council and the N. A. R. D. Executive Committee will be held in Washington on November 9. On November 7, 8 and 10 the A. PH. A. Council will meet separately for its fall sessions.

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An *allergy* unit has been set up in the College of Medicine and the College of Pharmacy at the University of Illinois. The program to train allergists and study allergies is expected to be the most comprehensive in the country.

OPPORTUNITY

The demands upon the professions in the postwar world require thorough training. Young men and women will find opportunities for successful and interesting careers in Pharmacy, Chemistry, Bacteriology or Biology, gained through courses of study at this institution leading to B.Sc., M.Sc., and D.Sc. degrees. Inquiries from returning Servicemen invited. Write for catalog.

Philadelphia

COLLEGE OF PHARMACY AND SCIENCE

43rd Street, Kingsessing and Woodland Aves., Philadelphia 4, Pa.

THE WHITE HOUSE
WASHINGTON

October 18, 1945

Dear Dr. Moulton:

The pharmacists of the Nation have earned the thanks of the American people for the splendid service which they have rendered during the war years. The thousands of pharmacists who have served their country in the Army and the Navy and the additional thousands who have kept a careful watch on the health of the civilian communities have achieved a record which merits highest praise.

All of the services whether in the field of manufacture, distribution, or law enforcement have been coordinated with a view to making a maximum contribution to the war effort. My message to the American Pharmaceutical Association as you prepare to observe National Pharmacy Week from November fourth to November tenth is to carry on with the same efficiency as we enter the era of reconstruction immediately ahead.

Very sincerely yours,

Harry S. Truman

Dr. George A. Moulton,
President,
American Pharmaceutical Association,
2215 Constitution Avenue, N. W.,
Washington 7, D. C.

The Hospital Pharmacist

EDITORIAL

by LEO F. GODLEY

AMERICAN SOCIETY OF HOSPITAL PHARMACISTS

THERE has been an obvious tendency in some quarters to complicate the nomenclature of medications. The manufacturer is anxious to have a trade name that will "take" with the doctor. The doctor seems to welcome an easy-to-remember, easy-to-write term. The pharmacist has nothing to say. Before long all groups speak of this name as though it had precedence over the official title of the same drug.

There are numerous glaring examples of this type. In the final analysis, the pharmacist has a half dozen brands of ferrous sulfate tablets, a dozen of vitamin B complex capsules, and as many of digitalis tablets. All of these may be labeled U. S. P. quality.

Another very popular practice with some manufacturers, which increases the number of duplications or near duplications, is that of applying a magnetic trade name to preparations that are unnecessarily made "different" by taking out or adding an ingredient to a standard formula. This is particularly popular in common analgesic and laxative formulas. One has only to look through the advertising pages of a magazine to find numerous examples of these types.

The hospital pharmacy that permits all such duplications on its shelves is bound for a high inventory, a large amount of dead stock, and loss of discounts by having to purchase a small amount of several items as opposed to a large amount of a few items.

Progressive hospital pharmacists have noted this potpourri that has accrued in the conventional four thousand years, evaluated same, and brought the matter forcefully to the attention of their therapeutics or pharmacy committee. Through this medium, authority for establishing a "restricted drug scope" is obtained. Actually, the drug scope is not restricted (that is, none of the physicians feel that therapy is hindered); the duplications have merely been ruled off the list.

Preference is given to a drug, first of all, if it is included in the U. S. P., N. F. or N. N. R. No trade name is admitted if the same drug is obtainable under an official title. No drug of secret formula is used. Proprietary medicines and new drugs are admitted for controlled investigation and accepted tentatively until such time that they may be admitted by the N. N. R. or official compendia. No mixture of two or more drugs is admitted if the action can be accomplished by one drug alone; evidence for proof of this must be studied. Orally administered drugs are given preference to those of comparable value used parenterally. By employing these criteria, one drug may suffice for several.

The restricted drug scope carries with it many advantages other than the fact that it is the sane and sensible approach to rational drug therapy in an institution. Most important, it impresses on the mind of the physician that drugs used are selected through an official channel.

The benefit from an economical point of view as far as the institution and patient are concerned can well bear reiteration. Handling, dispensing, labeling and inventory are immeasurably simplified. Dead stock does not accumulate when a more engaging trade name appears on the scene; and interns and nurses do not have to struggle to associate the actual names of drugs taught them with the myriad of trade names and duplications.

It has been said that the hospital pharmacy should be a diplomatic door to rational therapeutics. This suggested plan in drug scope offers one avenue of approach. In this connection, the following list of references may be helpful.

Dooley, M. S., and Reifenstein, E. C.: Rational Drug Therapy in Hospitals, *Hospitals*, January, 1941.

Clarke, Donald A.: The Formulary System, *Hospitals*, March, 1941.

Stainsby, W. J.: Economies in the Hospital Pharmacy, *Hospitals*, July, 1940.

Smith, Austin E.: The Hospital Pharmacy, *J. Am. Med. Assoc.*, March 27, 1943.

Dooley, M. S.: "Advantages of a Restricted Drug Scope in Hospitals," Hospital Bureau of Standards and Supplies, Inc., 247 Park Ave., New York, 1942.

PHARMACISTS IN HOSPITAL ADMINISTRATION

by D. O. McCLUSKY, JR.

ASSISTANT SUPERINTENDENT AND CHIEF PHARMACIST,
SOUTH HIGHLANDS INFIRMARY, BIRMINGHAM, ALA.

HOSPITAL pharmacy, a specialty in itself, opens further sidepaths of endeavor for those with special aptitudes. One field in particular offers opportunities—recognized by both the medical and nursing professions—for an excellent career for those with administrative ability.

Hospital administration at a time in the past was more or less vague and inconsistent regarding qualifications, duties and potential opportunities. In recent years, through efforts of the American Hospital Association, American College of Surgeons, American College of Hospital Administrators and many other groups and individuals, hospital administration has been more clearly defined and its importance more clearly understood and recognized by hospital boards, trustees and the laity in general.

Qualifications

It is not the purpose of the writer to attempt in any way to formulate the basic requirements for a good hospital administrator. There are, however, recognized traits of character and gifts of natural ability that are all-important for a successful career. Certain of these factors are indeed prime requisites for achievement in any field.

THOSE WITH EXECUTIVE ABILITY AND A WILLINGNESS TO ACQUIRE BACKGROUND EDUCATION MAY FIND POSTWAR OPPORTUNITY IN INSTITUTIONAL ADMINISTRATION

Administrative ability naturally provides the framework for success, especially in the larger institution where authority must be delegated to subordinates. In the smaller institution much of the work may be supervised personally by the administrator. Executive ability, personality, neatness, sobriety, aggressiveness, inquisitiveness, leadership, thoughtfulness, sympathetic understanding, civic mindedness, firmness, decisiveness, ambition, determination and studiousness are all assets for anyone seeking a career in hospital administration. Even though an individual possesses or develops the many traits of character or leadership, these must be moulded and tempered by educational background and experience.

It has always been advantageous, if not essential, that an individual aspiring to hospital administration must have a knowledge of the basic fundamentals of procedures and routines in a hospital, a knowledge of the function and service of its many departments. The problems of administration become more and more complex each year as the internal hospital organization becomes more intricate, and its external relations increase in diversity and importance.

There is a growing recognition that hospital administration is a distinct profession, and that it requires special aptitudes and a definite and varied fund of knowledge. Today, hospital administration involves a knowledge of the basic principles of nursing, medicine, business, economics, social service, engineering, personnel management, finance, accounting, public relations, and at least an appreciation of the importance and function of many other fields. It would certainly be advantageous to have a knowledge of public health and its requirements.

It is in these respects that a hospital pharmacist would be particularly well qualified, both by education and experience. By the very nature of his education, he is well aware of the public health aspects and needs of the community. There comes to him quite naturally a sensitiveness to the public health needs of the country as a whole, an asset in meeting many problems that arise in hospital administration that require just such an understanding.

Steps That Must Be Taken

For the pharmacist in a hospital who desires to enter the field of hospital administration, there are many steps to be taken, many activities in which to participate.

He must first of all develop his own department, so that by the mere fact of its successful operation he can get the interest and understanding of his immediate administrator in his new ambition.

He should participate in all group activities within his institution and develop his qualities of leadership. He must participate in many activities outside of the institution, such as civic clubs and community projects. Certainly, he should be active in the local, state and national organizations, both hospital and pharmaceutical. He will want to appear on programs when possible, serve on committees, attend all meetings and in other ways become as active as possible in these organizations.

He should write articles where he is properly qualified, and submit them to the national journals for publication. It is also through these journals that he can keep thoroughly posted on hospital problems and developments. They offer the best possible medium for an expression and interchange of ideas.

He must be a quick thinker and firm in decisions, and in this a thorough knowledge of personnel psychology will help greatly.

Make it a point to study the qualifications for other jobs in the institution, as well as the type of person who handles best each position. Study human relationships and, if possible, take an extension course in personnel management.

A pharmacist desiring to enter the field of hospital administration should make every possible effort to enter one of the schools that offer a course in hospital administration, such as Northwestern University. A Bachelor of Science degree in pharmacy, per se, is usually not acceptable for admission to such schools, any more than a degree in medicine, nursing or business administration would qualify without a proper evaluation of the curriculum and of the background and other qualifications of the individual.

The aspirant should, by all means, attend one or more of the Institutes for Hospital Administration. Sponsored by the American College of Hospital Administrators, these institutes present outstanding men and women in the hospital field as lecturers on the various departments, services and problems of hospitals.

The tasks and problems of a hospital administrator, as is true of a department head, are a constant and never-ending challenge to the qualities of leadership, organizing ability, human understanding and administrative capacity.

The writer has been unable to obtain definite statistics as to the number of hospital administrators who have backgrounds in pharmacy, but there are many who have been very successful and many others who are successfully occupying the position of assistant administrator.

Successful Careers

The records of the American College of Hospital Administrators show that nine of their members have pharmaceutical backgrounds. Even though this number may be comparatively small, it is significant that two of these nine members are on the Board of Regents of the College. To become a member, an applicant must have been in a position of administrative importance for at least three years, must have participated in programs, written articles and otherwise proved his intention and ability before he is approved by the College for nomineeship; after occupying this position for the proper period of time, and after having proved himself outstanding in the field, he may apply for approval as a member. Thus, it is obvious that membership in the American College of Hospital Administrators is, in itself, evidence of success attained, but to be a member of the Board of Regents of that institution of approval is an even greater recognition. And yet, of the fifteen members of the Board of Regents of the College, *two* had backgrounds in pharmacy.

The writer has become familiar with the careers of several of the affiliates of the American College of Hospital Administrators with backgrounds in pharmacy.

Lewis E. Jarrett, M.D., director of the Touro Infirmary, graduated in pharmacy in 1922 and taught dispensing pharmacy at the Medical College of Virginia until he entered medicine in 1928. Dr. Jarrett worked as night pharmacist and assistant superintendent during the four years he was in medical school. Following

graduation, he became the superintendent, a position he held until he accepted his present post in New Orleans. Dr. Jarrett is quite active in association work and is well known in the hospital field.

Capt. Russell H. Stimson, Medical Administrative Corps, A. U. S., Regional Station Hospital, Ft. Bragg, N. C., is a pharmacy graduate of Western Reserve University. Capt. Stimson was chief pharmacist at Babies' and Children's Hospital and Maternity Hospital, Cleveland, for five years; chief pharmacist, University Hospitals, Cleveland, five years; chief pharmacist and supervisor of store room, Huron Road Hospital for three years; and then director of the out-patient department, chief pharmacist and supervisor of store room and purchasing at the same hospital for five years.

He entered the Army in 1942 and is director of dietetics and custodian of hospital funds at his present station. Capt. Stimson feels that he has benefited tremendously from his experience in the Army, so that he will be even better qualified as a hospital administrator in the postwar period. A number of other pharmacists in the Medical Administrative Corps have likewise been successful in administrative work in Army hospitals.

Another excellent example is that of Ray Amberg, superintendent of the University of Minnesota Hospital, Minneapolis. Mr. Amberg was employed as a registered pharmacist in one of the University's hospital units while a student in the school of business at the University of Minnesota. His work not consuming all of his time, he offered assistance in other departments—laboratory, X-ray, physical therapy, and finally in the business management of the institution.

The University then undertook to give him some formal training in administration and appointed him as one of the assistant administrators. Mr. Amberg modestly states that "here he decided he would have to make some endeavor to improve himself in regard to the field." Apparently, Mr. Ambert has never slackened in this "endeavor to improve himself," as he is not only very active in the field and the author of a number of papers, but is a member of the Board of Regents of the American College of Hospital Administrators.

There are of course many hospital administrators with backgrounds in pharmacy who have not been in the field sufficiently long or for other reasons have not affiliated with the College.

In smaller hospitals, there is an especial opportunity for pharmacists to enter the field by perhaps serving in a dual capacity. Here the pharmacist may also be purchasing agent, as well as administrator. That such possibilities exist for the pharmacist with special aptitudes to extend his horizons is recognized in the following quotation from a recent paper by Van C. Adams, superintendent of Jewish Hospital, Cincinnati:

"Several writers have urged the pharmacist to prepare himself in allied fields, such as clinical laboratory, hospital administration, and especially purchasing. I believe this to be a most worthwhile proposal."

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—B—

HOSPITAL LITERATURE INDEX, Bacon Library, *American Hospital Association*, 18 E. Division St., Chicago 10, $3 per year. First issue of semi-annual compilation, listing by author and subject the articles dealing with hospital problems.

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James Hartley Beal, 1861–1945

THE death of James Hartley Beal which occurred at his home in Fort Walton, Florida, on September 20 takes from American pharmacy one of its most outstanding figures. On page 346 of this issue there are biographical data which cover the chronological record of his services to pharmacy. Here we are privileged to record some personal impressions of the man, written by one of his contemporaries and intimate friends who preceded him to the Great Beyond.

In a letter from Mrs. Laura E. Whelpley, widow of the late Henry M. Whelpley (1861–1926), also a past president and for many years the treasurer of the AMERICAN PHARMACEUTICAL ASSOCIATION, we are told that Beal and Whelpley, who were great friends and co-workers in the A. PH. A., had agreed that whenever either one should die the survivor would appropriately record an appreciation of the deceased. Dr. Beal who survived Dr. Whelpley by almost twenty years carried out the agreement by paying a beautiful tribute to Dr. Whelpley in a short speech at his funeral (THIS JOURNAL, 15:714, 1926).

Later, in going through some of the late Dr. Whelpley's personal effects, Mrs. Whelpley found an envelope marked "Dr. Beal" which contained what was evidently Whelpley's estimate of his contemporary, prepared at an inspired moment and filed away for possible future use. Mrs. Whelpley has kindly made this document available for publication.

Dr. Whelpley wrote as follows:

"I first came in touch with Dr. Beal when he became Ohio correspondent for the *Meyer Brothers Druggist*, of which I was editor. We first met when the St. Louis delegation joined the Cincinnati delegation to the AMERICAN PHARMACEUTICAL ASSOCIATION meeting en route to Asheville, N. C., in 1904. This event brought me face to face with the man in pharmacy whose acquaintance and friendship I have most cherished; a man who did not thrust his opinion on others but when consulted always spoke his honest convictions; a man with interesting and varied contacts outside of pharmacy which brought him in touch with the breath and color of the world at large.

"His conscious touches of satire were thought-provoking but not provocative of resentment for they never bore venom. He was a man of rare insight and a wide range of knowledge. He displayed originality without audacity; resourcefulness with fairness and justice; always punctual but never hasty; modest but respectful; firm but considerate; a man of great versatility and power of concentration.

"Although Dr. Beal was a man of highly individualistic character, this never led him to violate the proprieties of society or the customs of the times. He was never commonplace nor monotonous. Everyone respected his learning and admired his accomplishments.

"He was not a 'horn blower' but his whispers carried far. Their echoes will reverberate in the ears of pharmacists for generations to come. He never used involved language but spoke in a clear and concise manner.

"It has been my privilege to be in frequent personal touch with Dr. Beal for many years. Although the clock of time has continued to tick, his advancing years spelt not decay, only maturity in humaneness and wisdom. His eye lost none of its perspicacity and human glitter and his judgment none of its characteristic edge, as the years rolled by.

"Beal had that broad view of life which made him anxious to promote those things that would be helpful not to one but to all.

"He was never hasty in making decisions. He carefully examined all of the relevant facts and then selected the course to be pursued. Much of his life work is recorded in the proceedings of the A. PH. A., the drug journals, the minutes of the U. S. Pharmacopœial Convention [from 1900–1940], in the work of the N. A. R. D. and in almost every state association proceedings and in the memory and hearts of all who knew him.

"Beal conceived and dictated the purpose and scope of local, state and national organizations. He had mastered association work in and out.

"Strangers had no reason to be hesitant in approaching him as a man of great attainment and national prominence for he carried none of that aloofness or sheer love of altitude which

isolates some of our great men. He enjoyed being a friend of man.

"In his deportment Dr. Beal was modest almost to the point of self-effacement. He was genial to friends and strangers alike. He was inspired with a lofty conception of the duty of man to the welfare of humanity. He was generous with his time and money toward many enterprises which had nothing to offer in return except the knowledge of service well performed.

"He early recognized that all pharmaceutical interests are closely bound together and quite dependent on each other. This led him to bring about the organization of the National Drug Trade Conference.

"In an argument Beal won his way by logic. He had no use for sophistry or fallacy. He never practiced the art of beclouding the mind of an opponent nor deviated from the discussion of the question under consideration. His delivery was deliberate but his enunciations were emphatic.

"In addresses written for publication, Beal would discuss a topic at great length. His sentences were short, clear and forceful. He always avoided circumlocution and took first rank for brevity and perspicuity. His thinking was clearly and vigorously expressed.

"As a scientist Beal belonged to the class who view the story of life as a whole rather than from the narrow concept of the specialist.

"There were a score of ways in which Beal could have enjoyed his life without special exertion but he had a vision and an inflexible determination to be of service in pharmacy.

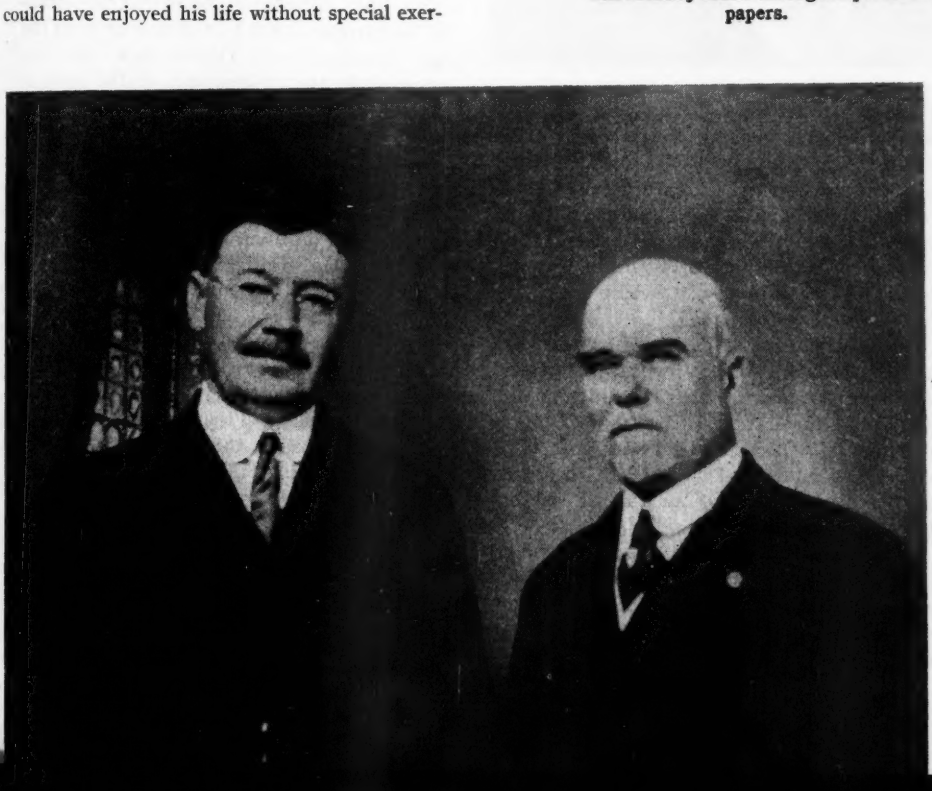
"His discussions on legal matters were always thought provoking. He spoke plainly and in simple language but conveyed deep and weighty lessons. His exceptional mind was compelled by an inner urge to attempt to penetrate into the mists that conceal the unknown.

"His life has been one of the greatest inspirations and incentives to high and thorough endeavor to the many who had the privilege of knowing him. His friendships were many and as strong as the man himself. We loved him as a man and admired him as a benefactor of pharmacy.

"We soon forget the life and death of a person and fix our attention upon the passing. The life of James Hartley Beal has made an impression on his day and generation which will be felt for the benefit of pharmacy and the welfare of humanity for time to come. In passing, he leaves the golden tint of a well-spent life."

Whelpley's tribute to Beal which has remained unpublished these many years undoubtedly echoes the sentiments of other contemporaries

DR. JAMES H. BEAL (left) is shown with his contemporary and close friend, Dr. H. M. Whelpley, whose eulogy to Dr. Beal, published above, was recently found among his personal papers.



who shared in the leadership which James H. Beal gave to the AMERICAN PHARMACEUTICAL ASSOCIATION and to American pharmacy.

Highlights of His Life

DR. JAMES H. BEAL had not been able to participate actively in pharmaceutical affairs in recent years because of ill health and advanced age; he nevertheless retained an interest in pharmaceutical proceedings to the end of his life, which had been rich in accomplishments in many directions. At the time of his death, Dr. Beal lacked just three days of reaching his eighty-fourth birthday.

His contributions to pharmacy included long service to the AMERICAN PHARMACEUTICAL ASSOCIATION in a great many capacities, notably as general secretary, president and first editor of the JOURNAL. Because of the wide span of his ability and interests, Dr. Beal left his impress upon the profession as a pharmacist, chemist, lawyer, educator and scientist.

Born on September 23, 1861, in New Philadelphia, Ohio, where he received his early education, Dr. Beal became interested in pharmacy while still a boy through nature studies which included the collection of drug plants.

After leaving school he was employed in a retail pharmacy at Uhrichsville, Ohio, and later in Akron. While there he was tutored in chemistry and Latin at Buchtel College. He continued his studies at Scio College, receiving a bachelor of science degree in 1884, and bachelor of arts in 1888. Later he took additional work in pharmacy and chemistry at the University of Michigan. Here he began his education in law, subsequently entering the Cincinnati Law School from which he graduated in 1886.

Other degrees included a Ph.G. from the Ohio Medical College, Doctor of Science from Mt. Union College, Doctor of Pharmacy from the University of Pittsburgh, and honorary Master of Pharmacy from the Philadelphia College of Pharmacy and Science.

Accepting the post of instructor in Scio College, Dr. Beal was soon given the chair of pharmacy and chemistry. He established a department of pharmacy in the institution which later became the Scio College of Pharmacy with Dr. Beal as dean. He was one of the founders of Pittsburgh Dental College, where he taught chemistry and metallurgy for many years, and was also professor of pharmacy at the Pittsburgh College of Pharmacy.

Although Dr. Beal actively practiced law for only a short time, he became a member of the Ohio State Legislature in 1901 and throughout later years maintained a keen interest in pharmaceutical law. While a member of the Ohio legislature he introduced and pushed to enactment the Beal Municipal Local Option Law. He was prominent in the development of the original Federal Food and Drug Act, the Harrison Narcotic Act and has taken part in the activities of various groups interested in legal aspects of the profession. He drafted model state pharmacy, narcotic and poison laws. Dr. Beal was directly responsible for inclusion of the U.S.P. and N.F. as legal standards in the Food and Drug Act of 1906.

A life member of the AMERICAN PHARMACEUTICAL ASSOCIATION, Dr. Beal was chairman of the Section on Education and Legislation as early as 1897. The following year he became second vice-president of the ASSOCIATION and by 1904 was president. At the time of his death he was the oldest living past president. He served as chairman of the Council from 1902 to 1908, in 1910–1911, and again from 1923 to 1925.

In 1911 Dr. Beal was elected general secretary of the ASSOCIATION. While serving in this capacity he founded and edited the JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION and continued as editor and general secretary until

1914 when he was forced to retire because of ill health. He has also held many other posts both as an officer of the ASSOCIATION and as chairman of various committees.

For thirty years he was chairman of the Board of Trustees of the U. S. Pharmacopœia and was a member of the Board for thirty-nine years.

He had been president of the American Conference of Pharmaceutical Faculties, National Drug Trade Conference and Ohio State Pharmaceutical Association, and was a member of the American Chemical Society.

In recognition of his many services to the profession, Dr. Beal, in 1919, became the first recipient of the Remington Medal.

Dr. Beal is survived by his widow and a son, Dr. George D. Beal, assistant director of Mellon Institute and chairman of the A. PH. A. Council, and a daughter, Nannie Esther Beal Starkey.

Typical Days

From the Secretary's Diary for September

—4TH—

THE Labor Day week end being over, everyone appeared rested and fresh for the heavy fall schedule that lies ahead. Fortunately, the callers were few because the mail of the past few days was heavy indeed.

—5TH—

Today came Major Einbeck and George Frates to review the proposed agenda for the coming meeting of the Committee on Status of Pharmacists in the Government Service. Both these members of the Steering Committee have their feet on the ground and they know something about the military and the legislative mind. When one considers the poorly drawn legislation which was enacted to create the Pharmacy Corps, and the compromises which were made in the enactment of this legislation, the criticism of the present committee for alleged failure to accomplish more with this legislation seems somewhat unfair. What is needed now is concerted effort to revamp the original legislation to provide for the things which pharmacists thought they were getting when the original bill was passed.

—6TH—

A new experience today in that requests for Pullman reservations were immediately forthcoming from both Pennsylvania and B. and O. without fervent pleas. Perhaps the war is over after all.

—10TH—

Early in the morning to New York City for numerous conferences, and enjoyed particularly a long chat with President Dunbar of Burroughs Welcome Company, who had just returned from England and was able to give us a bird's-eye view of British pharmacy in its postwar aspects. Particularly glad were we to learn that the British Pharmaceutical Society's new building, partially completed before the war, had not been destroyed.

At lunch and all the afternoon with the Board of Directors of the American Social Hygiene Association at Hotel Roosevelt planning for the coming year's activities which include those of the Joint Committee of the AMERICAN PHARMACEUTICAL ASSOCIATION and the American Social Hygiene Association working for better control of venereal disease. Later at dinner with the A. S. H. A. Board of Directors and staff and after that more planning and discussion, far into the night.

—11TH—

In touch with the Washington office by telephone and disposed of numerous emergency matters and such of the mail as had been forwarded. Further conferences on penicillin and streptomycin and then to the Broadway Limited bound for Chicago.

—12TH—

Early to the office of the American Medical Association and found Dr. Austin Smith, secretary of the Council on Pharmacy and Chemistry, extremely helpful and cooperative in the arrangements for the conference we are calling to discuss better regulation of the distribution of barbiturates. Next to the N. A. R. D. office for a luncheon conference with Secretary John Dargavel who has some problems not very different from our own, and as usual a profitable exchange of views.

Later to the College of Pharmacy of the University of Illinois and found Dean Serles deeply engrossed in the development of predictive and achievement tests for applicants who wish to become pharmacists. The equipment and facilities of this institution have been beautifully integrated with the Colleges of Medicine and Dentistry on the same campus, and it is a pleasure to note what can be done in such an atmosphere and on such a truly cooperative basis. Also a brief meeting with Dr.

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Allen, Executive Dean of the Chicago Colleges, and Dean of the College of Medicine of the University, who does not consider pharmacy a stepchild. Finally to the Edgewater Beach Hotel for Joe Shine's cocktail party and John McPherrin's dinner, in advance of the meeting of the Conference of Pharmaceutical Association Secretaries, which starts tomorrow. Joe was the usual genial and perfect host, and John performed equally well as master of ceremonies for a series of impromptu remarks from those assembled.

—13TH—

Twenty-seven pharmaceutical association secretaries gathered for the meeting which all had been looking forward to for many months. And it was good that this group was able to get together and discuss the comprehensive agenda prepared by efficient Secretary Clara Miller. It was work all morning and all afternoon with group luncheons and dinners right in the same hotel. After dinner, a ong talk with President Moulton who had just returned from a mission to Puerto Rico which will undoubtedly be productive of much good will and increased membership from that territory.

—14TH—

Much of the morning session of the Secretaries' Conference devoted to discussion of relations between the national and state associations, with resultant clarification of several issues. On the 2:10 p. m. via New York Central to Toledo and thence to Columbus for a conference with Dean Christensen with some amusing travel experiences on the way, illustrating the popular radio program, "people *are* funny."

—15TH—

All morning at the hotel discussing problems first with Secretary Ford of the Ohio State Board of Pharmacy and then with Dean Christensen of Ohio State University, who is chairman of the Executive Committee of the American Association of Colleges of Pharmacy, and much concerned about a meeting of the Executive Committees of the national organizations to thrash out problems of student deferment, freshman enrollment, refresher courses and special courses for GI's. The colleges may be thankful that Dean Christensen is alert to all of the problems of his member schools and anxious to meet these problems in a safe, sane and forward-looking manner. In the afternoon with Ford journeying by motor to Washington Court House, Ohio, and return, stopping just outside of Columbus for one of the best steak dinners of either the war or prewar era, and then to the 9:25 p. m. Spirit of St. Louis.

—18TH—

Early to the office to rush through the morning's mail and in the midst of storm and rain to the Union

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Station for the 10 o'clock train to Baltimore. After an hour's discussion at the station with Kenneth Miller of the American Social Hygiene Association, who was en route to Washington, and revision of V. D. mailing pieces and circulars for distribution through pharmacists, a lengthy visit with H. A. B. Dunning who is always alert to the interests of the A. PH. A. and never short of good advice and practical suggestions, backed by a wealth of experience.

—19TH—

The early morning tranquility interrupted by a fire alarm in the hotel which proved to be false, but nevertheless created sufficient excitement to make the morning's work seem tame, and this despite a spirited staff meeting at which A. PH. A. interests in many directions were fully discussed. During the afternoon welcomed Frank Delgado back from duties in the Middle Eastern theater and found him looking well and equipped with much new experience to add to the data accumulated over many years of activity in the government service. At night a three-hour session on the barbiturate problem, in preparation for the coming conference.

—20TH—

A short morning session with the laboratory staff and later a conference with Lt. Colonel Brown at Selective Service Headquarters. Late in the afternoon saddened by a wire from Council Chairman George D. Beal announcing the death of his father, James H. Beal, whose contributions to pharmacy were legion. Late in the evening to the airport to meet George for a few brief moments between planes on his way to Fort Walton, Florida, where his father lived in recent years and where he will be laid to rest.

—21ST—

An unusually busy day at the office with letters and bulletins issued on the barbiturate conference, the passing of James H. Beal, and requests for information on medical care plans. A luncheon conference with T. D. Delehanty of the Bureau of Foreign and Domestic Commerce on our relations with South and Central America, especially as they pertain to drugs and medicine. Later a conference with representatives of the Senate committees arranging hearings on the various bills to provide for coordination of scientific research after war contracts have been completed and the regimentation of science can no longer be continued on the basis of necessary aid to the war effort. It appears that we may be called to testify.

On the way to Trenton for the weekend met Dr. William Snow, who with Walter Clarke makes the team constituting the strong men of the American Social Hygiene Association who have the distinction of having worked for social protection throughout World War I as well as World War II, and a mighty efficient job has been done.

—24TH—

All morning at a conference of scientists and law enforcement officials struggling with the problem of how to classify DDT under the poison schedule. A complication is the restriction of sale to pharmacists if DDT is declared a poison. Late in the afternoon to Washington and arrived in time to do some reading of the mail and planning the next day's work.

—25TH—

After the morning routine and a staff meeting, followed by a quick lunch at the desk, a long and fruitful meeting of the Committee on War Activities and Veterans' Affairs attended by liaison officers from the Army, Navy and Public Health Service. Here were thrashed out the procedures for assisting the discharge of necessary pharmacists. To dinner at the Water Gate Inn with Dean DuMez, discussing matters of importance to the colleges of pharmacy, and later to the office for a long session on membership correspondence and problems.

—26TH—

This morning came Dean D. B. R. Johnson of Oklahoma to tell of what is going on at the grass roots, and he indicated in no uncertain terms that the Congressional pressure which has been felt in Washington is the result of genuine agitation at home by the folks who want their GI's to return *now*. Later to the Wardman Park Hotel for a WPB farewell party which was to end farewell parties as far as the War Production Board is concerned. The signs clearly point to a folding up of this agency by October 31 and transfer of its duties elsewhere. Another evening spent on reviewing the barbiturate laws and regulations, in preparation for the October 12 conference.

—28TH—

Mixed with the morning routine were visits from Dean Henry Johnson of Connecticut and Charlie Bohrer now of West Plains, Mo., both here for meetings of the Committee on Status of Pharmacists in the Government Service. Much of the time of the conference spent in devising ways and means of overcoming the apparent opposition in the Surgeon General's office to the implementation of the Pharmacy Corps legislation, but the question was raised whether the fault does not lie with the incomplete compromise legislation that was accepted to hasten passage of the law.

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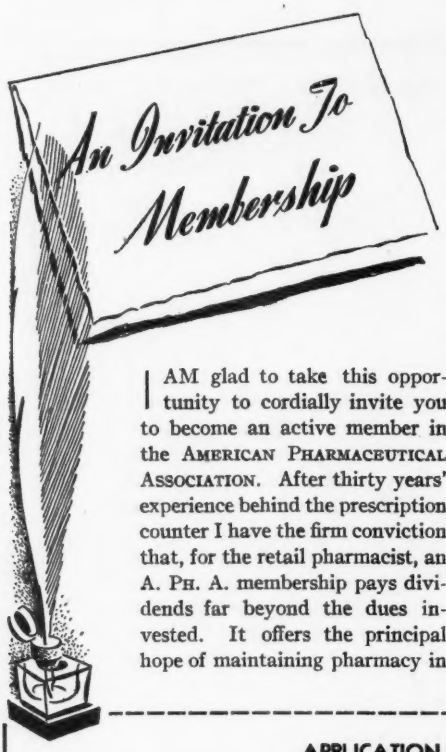

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I hope you will sign the application blank below and mail it at once. Help make sure the success of the postwar program the A. PH. A. has begun. Please accompany your application with any suggestions which may help us to serve your interests better.

Geo. A. Bowdoin

President.

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